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DISTRIBUTION OF STONE IMPLEMENTS IN THE TIDE-WATER COUNTRY.

BY W. H. HOLMES.

The tide-water portions of Maryland and Virginia have an area nearly equal to that of the State of Maryland. About one-fourth of the area is occupied by broad arms of the sea, chiefly Chesapeake bay and its tributaries, and the land is a low but handsome plain broken by erosion into hills, valleys, and terraces. It extends inland from the Atlantic seaboard to the base of the highland or Piedmont plateau, which rises on the west to the Allegheny mountains. The curved line separating the two topographic divisions—the lowland and the highland—is marked by falls in all the rivers and by the location of towns and cities through which pass the great highways of travel connecting the north with the south. Upon this line are located Philadelphia, Havre de Grace, Baltimore, Laurel, Washington, Fredericksburg, Richmond, and Petersburg (see Pl. I). This was the shore-line of the Atlantic when the formations constituting the lowlands were laid down.

The separation of the lowland from the highland is not a topographic separation only, there are pronounced biologic and geologic distinctions, and these combined in archaic times to produce marked anthropologic distinctions. The tide-water region furnished a plentiful supply of game and fish, and in the brackish and salt water areas an abundance of oysters. The natives lived much upon the water and were perhaps more nearly a maritime people than any other group of tribes in the east. Their peculiar biologic environment had a marked influence upon their art, giving it unique forms and exceptional distribution, but their unusual geologic surroundings had a still more pronounced effect upon their

implements, utensils, and weapons, limiting the forms and sizes and determining to a considerable extent the kinds employed in the various districts independently of biologic and other conditions.

In early historic times the tide-water country was inhabited by numerous tribes of Indians, mainly of Algonquian stock, subject to the renowned Powhatan. A few other nations were located about the headwaters of Chesapeake bay, and others appeared at times along the western and southern borders. The period covered by this occupation practically closed before the middle of the last century. Its beginning is not determined, but cannot extend very many centuries back into the past. Of antecedent or prehistoric peoples, if such there were, we have no information, for the art remains are simple and homogeneous, giving no hint of the occupation of this region by other than the historic tribes. The region is nearly identical with that explored by that intrepid and illustrious adventurer and colonist, John Smith, whose accounts of the natives are among our most valuable contributions to the aboriginal history of the Atlantic States.

The geology of the tide-water country is wholly unlike that of the highland, and the rocks available to the aborigines in the two regions were not only different in distribution but peculiar in the shapes they took and in other features that affect the character of the utensils made and employed. In the highland, west of the dotted line on the map, the varieties of rock occur in massive forms and with definite independent distribution. The workable varieties, such as quartz, quartzite, rhyolite, jasper, and flint, were much sought by the aborigines of the lowland. Fragmental material was to be obtained almost everywhere upon the surface, but choice varieties were confined to limited areas and often to distant regions, and where the surface exposures were not sufficient to supply the demand, quarrying was resorted to and the work of securing, transporting, and trading or exchanging the stone must have become an important factor in the lives of the people. The masses of rock were uncovered, broken up, and tested, the choice pieces were selected and reduced to forms approximating the implements to be made, and in this shape were carried to the lowland.

In the lowland all varieties of hard stones are fragmental and the species are intermingled in varied ways. These fragments of rock are not merely broken angular pieces, such as characterize the surface of the highland, but are rounded masses and bits, known as

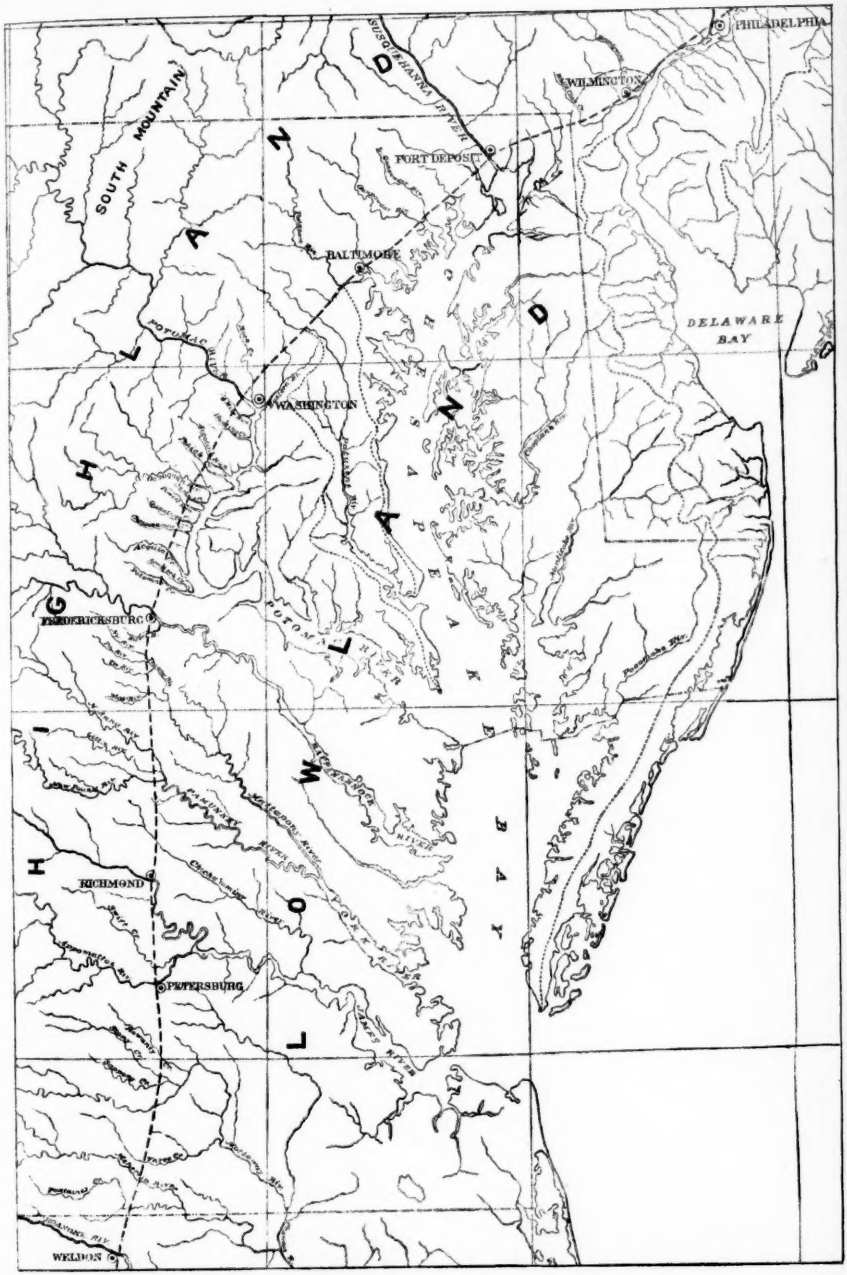

PLATE I MAP OF THE CHESAPEAKE TIDE-WATER REGION

bowlders, cobbles, and pebbles, and comprise chiefly such tough, flinty, homogeneous stones as are available in the arts of primitive men. Nature, in her own way, selected from the highland along the stream courses the very choicest bits of the crumbled rocks, reduced them in hundreds of cataract mills and in the breakers of the sea shore to rounded forms, and deposited them here in the lowlands in great heaps and beds ready to the hand of primitive man.

At first it would seem, to even the keenest observer, that a cobble-stone or ovoid bowlder or pebble would be a difficult form of stone to utilize in making knives, spear-points, arrow-points, drills, and scrapers. The smooth rounded mass had to be transformed into a thin blade, every contour of which is incisive or angular. So far apart are the two classes of forms that few people have thought of the bowlder as a prominent source of these objects, but when we look into the matter more carefully we find that nature has not provided any other form or conformation of the several tough varieties of stone so perfectly suited to the purposes of the stone-implement flaker as the bowlder or pebble.

Each river brought down from the highland only such varieties of stone as belonged to the drainage of that river, so that in one valley one set of materials prevails and in another a different set of materials appears, varying with the geologic formations of the region drained. Rivers having identical formations will have nearly identical bowlders. Long rivers crossing numerous formations will have many varieties, short rivers crossing but few will have but a limited number.

There is also a selection as to size by each drainage way. Near the base of the highland, where the force of the current is reduced by meeting tide-water, the larger bowlders are dropped, the smaller ones are deposited farther down, and the pebbles and sand are carried far seaward. Small and weak streams transport fewer pieces and drop them sooner. This selection does not hold good with ice transportation, which agency has carried irregular masses of stone to many widely distributed points. Notwithstanding the fact that all water-transported stones are more or less rounded, there is a selection with respect to degree of roundness. If dropped early in the progress of transportation the bowlder is imperfectly rounded; if carried far, it is fully rounded. Near the margin of the highland, therefore, there is a large percentage of imperfectly rounded stones, and farther out there is a small percentage of irregular forms.

XUM

These conditions are probably considerably modified by the action of the waves along the ancient sea-shore which skirted the base of the highland. Such fragments as were subjected to wave action became fully rounded and were deposited in beds along the ancient beach lines. It is not easy to distinguish the beach-rolled material from that rounded by the flow of streams, both agencies having, no doubt, frequently acted in turn upon the same material.

Again we observe that on river banks near the base of the highland many varieties of rock are present, but with each mile as we descend the number is diminished, the softer species are reduced to sand as they move toward the sea and one after another disappears. Quartz, being the hardest, is last to yield to the erosive agents, and at various points along the ocean beach well-polished quartz pebbles are found.

A comparison of the Potomac and Patuxent rivers, with respect to these points, is instructive. In ancient times both streams as they descended from the mountains gathered fragments of rock and carried them downward until the soft and friable ones were reduced to sand and the tough, flinty varieties became bowlders and pebbles. The latter consisted chiefly of quartz and quarzite. The Potomac was a long stream, heading far to the west and cutting through many ranges of mountains and hills. It crossed heavy beds of quartzite in the region of Harper's Ferry. This rock is tough and massive and breaks up into rather large fragments; thus it is we have many large quartzite bowlders deposited in the valley about Washington and below, the sizes diminishing toward the sea. Between Harper's Ferry and Washington the river crosses a belt of gneissic rocks intersected by many veins of quartz. This latter rock is hard and brittle and breaks up into small fragments, which, when rounded, are usually of the size denominated pebbles. These were taken up by the waters in countless numbers and distributed with the quartzite bowlders from Washington to the sea; but the quartz is harder than the quartzite and resisted the erosive agents more successfully, so that after the quartzite disappears there are still quartz pebbles in plenty.

The other stream, the Patuxent, has a limited drainage and does not cross the quartzite belt, but drains the quartz-bearing belt. Below the point of its entrance into the tide-water country at Laurel we find of the flakable stones chiefly quartz in small fragments; lower down all are well rounded, forming pebbly gravels.

It is thus seen that nature has selected the rocks used by the tide-water peoples and has distributed them in groups varying with original location, with hardness, with toughness, with shape, and with size.

The effect of these conditions of distribution upon the stone art of the various districts was necessarily very pronounced. One community located conveniently to deposits of large bowlders used large stones, and the tools shaped from them average large. Another community located in a pebble-bearing district utilized pebbles, so far as they were capable of utilization, and this people had few large tools and many small ones, the average size being very small. Dwellers in quartzite-bearing districts had quartzite tools; those having quartz deposits had quartz tools, and those residing near the base of the highland had many varieties of stone, and hence used a much greater diversity of stone tools, since the working qualities or capacities of each stone varies from the rest.

As a result of these conditions the tide-water Potomac is rich in chipped tools both of quartzite and quartz of home production. The Patuxent yields a large percentage of quartz tools, most of which are native. The Potomac yields to the collector a large percentage of large tools; the Patuxent a large percentage of small ones. These remarks relate to the native varieties of material and implements made from them. Exotic materials had their own peculiar distribution, which will be examined farther on.

Nearly all rude, bulky implements of chipped stone and all failures or rejects of manufacture are, as a matter of course, found upon or near the sites from which the raw materials were derived. Rejects are large and clumsy on the upper tide-water Potomac, because of the large size of the bowlders available. They are small on the Patuxent, because the pebbles utilized were small.

Again, the percentage of the failures—the turtle backs and other refuse of manufacture—decreases rapidly with the distance from the source of supply of the raw material, extending little beyond it. This may be illustrated. In the vicinity of Washington we have a great deposit of quartzite bowlders. In Fig. 1 the dotted line may be taken as roughly indicating the workable bowlder-bearing area, and the angular markings show the distribution of rejects of manufacture. The successful blades and the finished tools produced would radiate much more widely, but would also diminish with distance from the source of supply, as indicated by the small strokes

in Fig. 2. Favorite routes of travel would receive the fuller supply of these objects, and dwelling and important hunting and fishing sites would have large supplies, as indicated by "village site" in Fig. 2. On the source of supply of the raw material failures and finished implements or rejects would exceed finished implements in numbers, but beyond this the latter are almost wholly prevalent. So-called paleolithic forms—the rejects of manufacture—are thus confined to limited areas, the areas producing the raw material; and it is easy to see how in various sections of the country before

FIG. 1.—Distribution of rejects of manufacture with respect to distribution of raw material.

the true nature of these forms was known certain localities were thought to have been especially favored by paleolithic man.

It would thus appear from what has been said that the artificial distribution of materials is limited by—is a modification of—the natural distribution, and that each class of artificial object is scattered in a way peculiar to itself; but the human agent is an important factor. Other things being equal, human distribution of small things is far, of large objects near; implements of war and

the chase travel far, domestic utensils remain near; improvised articles or devices are near, highly elaborated and valuable objects go far; with thoroughfares distribution is far, across thoroughfares it is near. Much-occupied sites are richly stocked with utensils, and slightly occupied spots have but few; sites near the source or sources of supply have a wealth of art, very distant ones have almost nothing; sites convenient to a plentiful supply of one material have many tools of that material, sites remote from any of

FIG. 2.—Distribution of implements with respect to distribution of raw material.

the sources have a limited supply from many sources. A sedentary people will not distribute widely; wandering or semi-sedentary tribes will transport their possessions to many distant places, and sites occupied by numerous tribes in turn will have diversified art remains. It may be further noted that on sites devoted to single or simple industries the range of tools will be small and on sites where occupations were varied the range will be large, and that

where peoples were varied, occupations varied, materials varied, and time long we will have the widest range.

The tide-water peoples were by no means content with the materials supplied by the province in which they lived, although these naturally received first attention. Not being favored by nature in the quality and range of their materials, they seem to have searched far and near for those finer-grained homogeneous varieties so much used in other regions. They sought flint in the mountains of Virginia fully a hundred miles beyond the tide-water limit; they discovered a slaty-appearing volcanic porphyry, called rhyolite, in South mountain, 75 miles northwest of Washington, and jasper and argillite were obtained from eastern and northeastern Pennsylvania. It is probable that in some cases the tide-water peoples made long journeys in search of these rocks and spent short seasons quarrying and roughing out the blank forms and selecting choice bits to be carried home. On the other hand, much of the material from these distant places may have reached the lowland by exchange or trade, and a certain amount, not ascertainable, of the supply of implements of exotic materials is no doubt due to visits and incursions by peoples occupying the region of the source of supply; for example, jasper may have been brought by the Susquehannocks of the north, and flint by the Monacans of the west. It may be that in time, by careful comparison of the forms of implements characterizing the various exotic materials, something may be suggested of the presence of neighboring peoples in or at least of their influence upon the art of the tide-water region. Distribution is very general, implements made of all of the varieties of stone mentioned being scattered more or less fully over the Chesapeake-Potomac country as far south as James river.

Jasper, the quarries of which have recently been located by Mr. H. C. Mercer, of Philadelphia, is more plentiful in the upper Chesapeake and Susquehanna regions. Argillite, which was obtained in the Delaware valley, did not find its way to any great extent into Maryland and Virginia, although several caches of blades have been discovered in the middle Chesapeake region, and implements are occasionally found. Rhyolite implements are most plentiful in the Patuxent and Potomac valleys, and especially in those portions of them adjoining South mountain. The quarries of this stone are in Pennsylvania, near the head of the Monocacy, and the implements are very numerous on that stream, and fragments of considerable size have been carried far down the Potomac.

Transportation was no doubt mainly by water. Probably one-fourth of the spear and arrow points of the Potomac region are made of this rock. Flint of a dark or blackish hue was used in making smaller projectile points, as were also quartz and jasper. These materials, breaking naturally into small pieces, were not well fitted for the making of large implements.

It should be noted that of these exotic materials we have in the tide-water country very few large or rude implements, and, as a matter of course, failures of manufacture are rare, save those that result from breakage during such specializing and finishing operations as were conducted subsequently to transportation from the quarry. Of quartz and quartzite, the native flakable stones, there are countless rejects of manufacture of all grades, as previously described.

It may be said of quartzite and quartz that a portion of these materials—perhaps a large portion, especially of the latter—were secured from the highland beyond the tide-water limit, and no one can say from the examination of ordinary finished implements of these materials whether or not they were made from a native bowlder or from a foreign mass or flake; but the presence of countless numbers of the rejects of manufacture from quartz and quartzite bowlders and pebbles within the tide-water area, and the rarity, so far as I have been able to discover, of refuse of manufacture in the highland, seem to make the true conditions clear.

Cut, pecked, ground, and polished implements of usual types are common in this region. Soapstone, used in making pots, pipes, sinkers, and ornaments, was quarried in hundreds of places along the eastern border of the highland. The unfinished objects are found on the quarry sites and upon dwelling sites near by. The finished utensils and implements are scattered far and wide, but grow less plentiful as we approach the Atlantic coast. The picks and chisels used in working the soapstone are confined to the quarries and their vicinity.

Axes, celts, and the like were made for the most part of tough bowlders of volcanic and granitic rocks obtained from the stream-beds or from the highland. Failures resulting from the manufacture of these implements are frequently found upon village sites along the banks of the larger streams. Rejection or failure was not uncommon even after the pecking operations began, and breakage under the pecking hammer was not rare. It is important to observe

that in many cases these implements were reduced to approximate shape by flaking, and this has given rise to several classes of flaked rejects, peculiar in shape and exceptional in material. These objects are of such rude forms that they are sometimes mistaken for very primitive implements, thus providing another trap for the unwary paleolith hunter.

The liability of the various stone implements of the tide-water region to transportation is approximately expressed in the following partial list. Beginning with those least subject to transportation and ending with those most subject to it, we have the following tentative order:

Mortars, generally improvised from bowlders having at least one concave surface which was gradually deepened by use. They were probably rarely far removed from the site of their first utilization. Many improvised tools and utensils, mullers, pestles, hammer-stones, etc., were equally home-stayers, as they were merely natural shapes picked up and adapted to the needs of an occasion.

Sharpened bowlders, improvised chopping or bone-breaking tools, occur on all river sites where bowlders were at hand. The edge or point was made by removing one or more flakes. They were not transported far beyond the limits of the bowlder-producing area.

Notched and sharpened bowlders, improvised axes, picks, or hoes, closely related to the preceding, but intended to be hafted. Their transportation was but slight, as they are rarely found beyond the range of deposits of heavy bowlders. Half a dozen blows with a hammer-stone were sufficient to fashion one of these objects.

Picks and chisels for working soapstone traveled but little beyond the quarries and the neighboring villages where the finishing was done. These consist of rude, sharp stones, of axes and celts worked over or "upset" to secure good points, and of thick leaf-shaped chisels reduced to approximate shape by flaking and then ground to an edge at one or both ends.

Net sinkers are not common and are usually rude. They were probably carried back and forth to some extent along the streams.

Pestles, cylindrical stones symmetrically shaped and well finished by pecking, were apparently carried from place to place and perhaps for long distances.

Hammer-stones: Many of these objects were improvised from bowlders and were quickly cast aside, as already indicated, but others were carried far out into the non-bowlder-bearing region, where they acquired by use or were given purely artificial contours.

Soapstone vessels are widely distributed, reaching in rather rare cases points 100 miles or more from the highland in which the material was quarried.

Grooved axes, celts, scrapers, drills, knives, spear-points, arrow-points, as well as *pipes* and *ornaments,* were freely transported, covering the full range of the peoples employing them, and not infrequently, no doubt, passing from district to district through other hands.

Rejects resulting from failures in specialization of transported forms and from attempts at remodelling of worn or broken tools are to be found everywhere, but rejects of the roughing-out processes are not seriously affected by the transporting agencies, remaining mainly upon the shop sites.

Some of the eccentricities of distribution may be illustrated by examples, sites having varying relations to the deposits of raw material being chosen for the purpose, as follows:

1. On a site of quarrying and manufacture where dwelling was inconvenient, as on the bluffs of Rock creek, the work was confined mainly to roughing out leaf-shaped blades, and the series of art forms comprise a limited range, including turtle-backs and other kinds of rejects and refuse. Nothing exotic, nothing finished, nothing that might not readily be classed as "paleolithic" by our American advocates of the idea of a rude stone age, was found in three months' work upon the shop sites of Rock creek.

2. On a site of quarrying and manufacture where dwelling was practicable and where lodges were actually pitched to a limited extent, we find intermingled with the rude forms some specialized ones and a few tools of exotic origin, such as projectile points of rhyolite and axes and celts, as at Riggs' mill, eight miles northeast of Washington.

3. On a site of manufacture and at the same time of extensive dwelling, as at Anacostia, D. C., where much raw material was at hand, all varieties of refuse and of rude forms are found; likewise well-shaped and wholly-finished specimens of flaked tools of local origin prevail. There are also all the cut, pecked, and polished tools and ornaments common to village sites. Besides these, many exotic materials in varied forms are found.

4. On a village site where no raw material, save small quartz pebbles, is found there will be a full range of small quartz rejects and of small quartz implements, with a liberal supply of finished implements of exotic materials averaging small.

5. On a site remote from all sources of raw material, as on the eastern shore, the objects average small and are much varied in material and style, having come far, through numerous peoples and from many sources.

Typical illustrations of the two last-mentioned varieties of sites are difficult to find, for the reason that in all sections, even far out toward the present ocean beach, there are occasional ice-borne bowlders and fragments of considerable size, and these were collected by the natives and used for mortars, mullers, and for various flaked and pecked implements, and such objects destroy the entire simplicity of conditions conceived for the sites described.

A synoptical statement is made in the accompanying plate (Pl. II) which exhibits many of the most striking features of the flaked-stone archeology of this province, and indicates clearly the points most requiring attention in other regions. The stories of the origin and form of the materials, of manufacture, rejection, elaboration, transportation, storage, specialization, and use are all expressed or suggested. Four materials are represented, two native, in the form of bowlders, and two exclusively exotic and derived from mass deposits. Each series indicates the course of development through which most of the finished forms passed between the first stroke given to the shapeless stone and the finished work of art.

In the first and second series all the forms, from the bowlder to the most minute art shapes, are represented in solid lines, being exclusively tide-water art. Nos. 1, 2, 3, 4, 5 and 6 are shop rejects, turtle-backs, etc., and are not implements. Nos. 7, 8 and 9 are roughed-out forms, blanks, blades ready for further specialization, and are not necessarily implements, although they were available as knives and scrapers. The numbers from 10 to 18 are specialized forms derived mainly, no doubt, from bowlders, and include knives, spear-points, arrow-points, and perforators or drills.

The second series comprises forms derived mainly from quartz pebbles, and which are naturally smaller than the quartzite forms. They are drawn in solid lines, being of native derivation. Nos. 1, 2, 3, 4, 5, 6 and 7 are shop rejects, turtle-backs, and are not implements. No. 8 is a profile, showing the ordinary "peak" or hump of the reject. Nos. 9, 10 and 11 are successful blades, which may have been employed as knives or scrapers, but were usually intended for specialization into arrow-points, spear-points, perforators, etc., as indicated in Nos. 12 to 20.

The third series, consisting of objects of rhyolite, is drawn

partly in solid lines and partly in dotted outlines. Those in solid lines comprise transported and specialized objects and were collected in the tide-water country. Those in dotted lines *a*, *b*, *c*, *d*, *e* and *f* are the rejects of manufacture and are not found in the tide-water country, being obtained only on the quarry-shop sites in Adams county, Pennsylvania. The successful blades, illustrated in *g*, *h* and *i*, were carried away from the quarry to be used as they are or for specialization when the succeeding forms, *j* to *q*, were needed. The whole tide-water province is abundantly supplied with all the forms from *g* to *q*.

The fourth series, composed of articles of jasper, repeats very closely the conditions of the third or rhyolite series. The sizes average smaller on account of the minuter cleavage and inferior massiveness of the rock. The rejects of manufacture, indicated in dotted lines, are obtained mainly from the recently discovered quarries in eastern Pennsylvania. Other quarries may yet be found, and some of our rivers furnish occasional bits and pebbles of this material. The cache and finished objects, *g* to *q*, are widely scattered over the tide-water region.

Stone implements have been studied as to form, material, and use, but there has been no systematic study of manufacture, and origin and distribution have been greatly overlooked. It is of the utmost importance that in taking up the stone implements of a region each leading material be traced back to its source, so that from this point of view a study can be made of the work of quarrying, shaping, transporting, and finishing. Each form or class of implement will thus be found to have left in its wake a trail of "wasters" or rejects peculiar to itself. Until these are understood, selected, and set apart there is necessarily much confusion.

It is seen by a study of Pl. II that a half or more of the native flaked forms of this region are actually not implements. The separation is approximately indicated by the upper braces marked "not implements" and "implements." It will be observed that this division separates the cache forms or blanks of the middle column into two parts. Portions of this class of objects were mere quarry shapes distributed to be elaborated when needed, but some of them were probably utilized in their blank shape as knives, etc., and some show a slight degree of specialization, as in No. 9 of the first series, and thus properly take their place with implements. Nearly all of the specimens shown in this vertical column are actual cache finds.

This study brings out other features of flaked-stone art which have not been understood and have thus given rise to much embarrassment and to much useless discussion on the part of those who have been talking of rejects as implements. Each material gives different forms of rejects. Each form of material gives its own styles of rejects. Each implement leaves its own peculiar rejects. If in the tide-water country six varieties of stone were used in the manufacture of flaked implements, if two of these materials occur in distinct forms and if one of them was employed in making two distinct types of implements, then there would be found here ten lines of refuse or "wasters," each furnishing its own peculiar types of rude forms. Several of these genetic lines have already been, as illustrated in Pl. II, more or less fully traced and the rejects separated from the implements. In other sections of America and in certain provinces of Europe there may be many more than ten distinct evolutionary series, and in Europe so many centuries and successive culture periods have passed and so much has been obliterated by thousands of years of metal-age occupation that the phenomena there must be both complex and obscure. It is plain, therefore, that if the European students of rude flaked stones have not been more discriminating than most of their pupils in this country, there is still work to be done there.

The distribution of cut, pecked, ground, and polished stone implements, and the refuse of their manufacture, is governed by laws similar to those governing the distribution of flaked stone.

Each province, district, and site, here and elsewhere, is supplied with art remains brought together by the various agencies of environment—topographic, geologic, biologic, and ethnic—and the action of these agencies is to a large extent susceptible of analysis, and this analysis, properly conducted, constitutes a very large part of the science of prehistoric archeology.

It would be instructive to examine in this place, so far as is possible, the effect of the distribution of the various kinds and forms of stone upon the habits, customs, arts, industries, etc., of the inhabitants of the region, for it is plain that so important an element of environment must have a most decided influence upon all departments of culture, but such a study would carry me far beyond the limits set for this sketch; besides, such a work can be conducted to better advantage where all the phenomena of human existence are observable as with living tribes, and the laws of culture evolution thus derived are applicable to all cases and fully answer the needs of anthropology.

Explanation of Plate II.

This synoptical grouping of the ordinary varieties of flaked stones found in the tide-water country will, in a great measure, serve as a key to the whole subject of flaked stone art in eastern North America, and will suggest a practical method of treatment for all sections. Varieties of flaked implements not included in this series are of rare or exceptional occurrence or belong to what I have designated extemporized tools

Specimens drawn in solid lines are obtained from the tide-water region. Those in dotted lines are not found, save in rare cases, within that region, having been left as refuse in the quarries in Pennsylvania from fifty to two hundred and fifty miles away.

The two upper lines have their genesis mainly in bowlders and pebbles; the lower lines are derived from materials quarried from the mass. The left-hand vertical column contains usual forms of failures, rejected in most cases on account of defective fracture which resulted in too great thickness, thinness being essential. Our so-called "paleolithic implements" belong in this column.

The middle column contains blades derived as indicated in the left-hand column. They were carried away from the quarries and shops to be used as they are or to be further elaborated. They are often found in caches or hoards where they were left by owners or traders. Some are slightly specialized, as *g* in the first line and *i* in the third line.

Quarry products at the transportation stage are necessarily not uniform in character. The blades, etc., accepted and carried away at one time may be ruder or less finished than those accepted and carried away at another time. In the third line, *f*, a reject from the quarry refuse may be more refined in shape than the transported and cached form *g*. Transporting and caching of raw material on the one hand and of finished implements on the other are not unknown, but caching was mainly the result of transporting and storing of roughed out implements in quantities not at once needed, and this was usually due no doubt to the intermittent nature of quarry production.

The right-hand column contains series of specialized forms, arrow-points, spear-points, knives, drills, etc., derived in the main as indicated in the genetic series. The smaller points were often made, no doubt, from small fragments or chips, but the process was essentially the same.

The process employed in roughing out and in the earlier stages of specialization was that of free-hand percussion with hammer-stones. The finishing was probably mainly by pressure with tools of bone.

The grouping as indicated by the braces should be carefully studied.

THE DEADLY MICROBE AND ITS DESTRUCTION.

BY D. S. LAMB.

Microbes, Micro-organisms, and Germs.—There may have been microbes, there doubtless were, away back in prehistoric ages, perchance before the time of the great lizards and pterodactyls. Béchamp believes that he has isolated living microbes from the chalk of the Secondary Epoch, and Dr. Gautier claims to have recognized the odor of their remains in prehistoric guano, in bone caves of the Stone Age and age of the Cave bear. If all this is true, it shows astonishing vitality in these minute organisms. Not until that famous Dutchman, Anton Leuwenhoeck, looked through his microscope into some rain water and, for the first time in the history of the world, saw forms of minute life, not till then, in April, 1675, 217 years ago, did there dawn upon mankind the possibility of knowing anything of the microbes.

The improvements in the microscope have given us better observations and more exact results. The significance of many things at first but imperfectly understood is now better known. For instance, Dr. Pollender in 1855 and Dr. Brauell in 1858 noticed in the blood of animals dead of anthrax or the splenic fever numerous fine thread-like forms, which multiplied by division. It was reserved for that greater observer, Davaine, to recognize that these little threads were microbes and were the cause of the disease. This discovery was but the beginning of a long series, the end of which is not yet. There are at least 185 known microbes.

The origin of the word microbe was on this wise: At the meeting of the Academy of Sciences, Paris, March 11, 1878, there was a prolonged discussion as to whether these minute beings were animals or plants, microzoa or microphyta. Dr. Sédillon, as a sort of compromise, suggested that they be called microbes, which means small living beings. His suggestion was adopted. Since then, however, it has been settled that they are vegetal, having a cellulose covering, deriving their nitrogen from the salts of ammonia and nitric acid like other vegetal bodies. Their protoplasm, however, contains no chlorophyll or green coloring matter, and so is unable to decompose

the carbonic acid of the atmospheric air; they are thus closely allied to the fungi. In some microbes the protoplasm contains sulphur or phosphorus; in others it does not. The effect of this difference in the chemical elements of their protoplasm is a varied reaction with staining agents, and this quality is a means of more readily identifying the varieties.

Microbes vary much in shape, and are named accordingly. The round or oval shaped is called a coccus. It reproduces itself by dividing into two of the same kind. These two together are called a diplococcus; these by subdividing may make a quartette, called a tetrad or merismopedia. Sometimes the subdivision forms a chain, called, therefore, a streptococcus. Each one of the subdivisions is a distinct and independent individual. The micrococci are also called spherobacteria.

Another form is the rod-shaped; the ends more or less rounded. This is called a bacterium or a bacillus; if somewhat curved in shape, often called vibrio. Heretofore the distinction between the bacterium and bacillus was mainly one of length; but it was soon found that this was not a very reliable distinction, and at the present day the name bacterium is applied to those which multiply only by division, while the name bacillus is given to those which have also the power of developing what are called spores. This whole group is also called microbacteria and desmobacteria. Another form yet is a spiral rod, called spirillum; called also spirobacterium.

Still another form is the long thread or filament, called, when straight, a leptothrix; when wavy, a spirochæta.

The manner of reproducing by division or fission, as it is also called, has given to all of these microbes the name schizomycetes. It is worth while to mention that in nearly all animals and plants reproduction, development, and growth are effected by this multiplication by division.

As to size, microbes are very small, varying from a 500th to a 50,000th of an inch in greatest length.

They are found in the air and the water and soil. They may travel long distances by the winds and waters, and may live for a very long time. Their increase is favored by warmth, moisture, and the presence of organic matter. A bacterium may divide into two in the course of an hour; these become four in another hour; and at this rate of increase we will have in 24 hours from one

bacterium nearly 17,000,000 individuals. In less than five days, at the same rate, they would fill all the great waters of the earth.

It is well to remember that a microbe which begins as a micrococcus may pass through the stages of bacterium and bacillus to that of spirillum. It is said, too, though this is also doubted, that a microbe which to-day is innocent—that is, will not produce disease—may to-morrow be hurtful. The oxygen of the air under pressure is known to modify its pathogenic or disease-producing power. Pasteur says that the oxygen of the air attenuates and extinguishes the poison. This fact may explain the spontaneous cessation of epidemics.

It has already been mentioned that some microbes are innocent—do not cause disease; but they nevertheless cause changes in organic matter. These innocent ones are in by far the greatest number, and by reason of this abundance interfere somewhat with our finding the hurtful ones.

The tenacity of life of the microbe is shown by the fact that many forms may be imbedded in ice without losing their vitality. Dr. Prudden has shown that certain bacteria may be frozen for 37 days and still be alive. Dr. Dornil, of Paris, has found that ice is often a medium of transmitting typhoid fever, and says that ice from rivers or ponds is as dangerous as the water itself.

The great factor in the distribution of most infectious diseases is human intercourse. At the present day the means and rapidity of intercourse are such that the danger of infection is much greater, and an epidemic spreads more rapidly and extensively than heretofore. Of course our methods of combatting disease are so much improved by isolation, disinfection, etc., that the terrible death-rate of past ages is not repeated in the present.

Examination of air to detect the presence of microbes has often been made, and the results show that they are in greater number in summer than during the other seasons, and appear to reach a maximum in August. Again, the higher we ascend in the air, the less the number. This is true of country and city. The air of the upper parts of the houses, the roofs, etc., contains fewer microbes than of the lower parts or the streets. The denser the population, the greater the number of microbes in the air. At sea, beyond, say, 120 miles from land, the air is generally free from them, although they are abundant in the sea water. The air of sewers has been examined by Carnelly and Pétri and found remarkably

free from microbes, less, indeed, than the air outside the sewers. The explanation seems to be that in sewers there is no dust, the walls are moist, and the microbes are retained in the moisture. The liquid contents are alive with bacteria. These do not find their way into the air of the sewer unless fermentation takes place and bubbles of gas are disengaged or splashing occurs.

It may be said, in passing, that the microbes of the soil play an important part in the nutrition of the plants. They act on the soil in such a way as to cause oxidation of organic matter and ammonium, forming nitric acid, nitrates, etc., which, in solution, are absorbed by the rootlets of the plants. A gram of soil may contain as many as two millions of microbes.

River water and other surface water contain them in abundance. Waters like those of springs and deep wells, which have filtered through the soil, are in that way deprived of microbes. Filtration through finely divided coke or charcoal or sand gives the same result. Pasteur has shown that water forced through porous porcelain is entirely free from them. Filtration of river water through sand has reduced the proportion of them from 43 to 1. Water of deep wells filtered through chalk rocks shows a proportion still less.

There seems to be no reason to doubt that the same means which purifies water from harmless microbes will do the same for the hurtful ones. It is well to note that while ordinary drinking water is not a favorable medium for extensive growth of disease germs, yet, if these are in the condition of spores, they may be found quite permanently in any water, however pure.

In the process of decomposition of animal matter a class of poisonous substances is formed, called alkaloids: animal alkaloids, to distinguish them from vegetable; cadaveric alkaloids, as indicating their *post mortem* origin. They are also called *ptomains*. The presence of these ptomains explains the many cases of poisoning from eating decaying animal foods, as sausages, fish, tinned meats, ice cream, etc. Their formation is due to the action of putrefactive microbes on the albuminous substances of the dead tissue. It is probable that the microbe takes a certain amount of the carbon, hydrogen, etc., of the albuminous bodies for its own nourishment and multiplication, and the ptomains are found in the residue.

Similar poisonous alkaloids may appear in the *living* organism by a change of the protoplasm or decomposition of the albuminoids. These have been called *leucomains*. They are found in small quan-

tity in normal human urine, and increase very much in number in certain infectious diseases.

A third class of substances similar to, but more poisonous than, the ptomains and leucomains has also been found in the living body, and they have been called extractives.

The great source of danger from microbes is believed to be in their poisonous products. In typhoid fever, Asiatic cholera, septicæmia, diphtheria, and some other diseases of this kind, the microbes produce the poisonous alkaloids and spread the infection. In cholera morbus there is a poisonous base called methylguanidin. Four alkaloids have been isolated from the bacillus which causes tetanus; they are called tetanin, tetanotoxin, spasmotoxin, and the fourth not named.

Pasteur believes that hydrophobia is due to a microbe which produces an alkaloid. The microbe itself has not been identified, but a poisonous ptomain has been obtained from the brain of rabbits suffering from the disease, and this ptomain produces the characteristic symptoms.

The comma bacillus of Professor Koch, called so from its resemblance to a comma, is undoubtedly the agent in causing Asiatic cholera. Alkaloids also have been found in the dejections in this disease.

The *bacillus typhosus* is found in typhoid fever; the alkaloid, however, called typhotoxin, is believed to cause the disease.

Malignant pustule, occurring especially in cattle, is due to a microbe called *bacillus anthracis;* the ptomain is anthracin.

Some ptomains are analogous, chemically, to certain vegetable alkaloids. Again, the same species of microbes will produce different ptomains, according to the organic substance in which they live.

Ptomains which are devoid of oxygen have a strong odor like musk, etc.; this odor is so persistent that, as previously stated, Dr. Gautier recognized it in the guano of prehistoric formation.

It is said that some microbes give rise to soluble ferments called *enzymes*, products of living protoplasm. Dr. Sheridan Lea has shown that the *micrococcus ureæ* secretes a ferment which converts urea into ammonium carbonate. Drs. Roux and Yersin have obtained a soluble poison from the cultivation of the *bacillus diphtheriticus*, which produces all the symptoms of diphtheria. It is an animal alkaloid, but a special ferment. It is proper, however, to say that the bacillus itself will cause the disease. In the case of the *bacillus anthracis*, the ferment produced will not cause the disease.

Pasteur has shown that if the blood of animals suffering with anthrax is filtered free from bacilli, the blood will not then cause the disease.

Drs. Lauder Brunton, and Macfadyen have shown by experiment that the microbes which liquefy gelatine do so by means of an enzyme. The enzyme can be isolated and its peptonizing action be demonstrated, apart from the microbes which produce it. For purposes of nutrition, microbes can form ferments adapted to the soil in which they grow.

The real cause of infectious diseases is, therefore, in some cases, the microbe; in others, the alkaloid or ferment, formed or secreted by the microbe. In most cases microbes produce both poisonous alkaloids and special ferments.

A few other interesting substances produced by microbes may be mentioned. The *torula cerevisiæ* or yeast plant, acting on sugar in solution, causes a fermentation which results in the production of alcohol and a residue. This is called the alcoholic fermentation. Again, the *bacterium aceti* produces vinegar in a pure state. The *bacterium lactis* acting on the sugar in milk produces lactic acid, causing the milk to become sour. All putrefaction results from the action of numberless microbes, the most important of which is the *bacterium termo.* The *bacillus butyricus* acting on butter makes it rancid; acting on cheese, causes it to ripen. The *bacillus tuberculosis* produces cellulose in the blood and tissues of tubercular persons, but does not produce an alkaloid.

Some microbes form pigment on the material in which they live. A few only of these are associated with disease. What is called indigo blue is produced by the action of a bacillus on indican, a substance existing in the indigo plant. This indican has also been found in human urine, especially in cases of intestinal obstruction and ulceration, and in granular kidney. The blue color of sweat is due to microbes. Many of these pigment-forming microbes are found in the air and give rise to patches of color on articles of food. The red spots which sometimes appear, especially on bread, and which in old times were supposed to be blood from the finger of an angry God, are known to be composed of groups of the *micrococcus prodigiosus.* Yellow milk is due to *bacterium xanthinum.* The blue color of litmus, used in testing acidity of fluids, is from the action of putrefactive microbes.

Some microbes acting on alkaline sulphates and organic matters in water, as in certain mineral springs, cause the freeing of the sulphur and disengagement of sulphuretted hydrogen.

Many of the lower animals have the power of making themselves phosphorescent. This luminosity is accompanied by the transition of peptones into organized living matter under the influence of free oxygen. This phosphorescence appears to depend on the action of certain microbes.

Experiments have been made to determine how great a degree of heat can be endured by them without being destroyed. The following are some of the results: The bacilli of anthrax and of swine plague were destroyed after exposure for one hour to a boiling temperature. The *spores* of the bacillus, however, required an exposure of four hours to the same temperature. As it is stated that none of the infectious diseases depend on the spores, it follows that their pathogenic microbes can be destroyed at a temperature of boiling point for one hour. Steam heat will destroy them and their spores in a little over five minutes.

On the other hand, many microbes will withstand a temperature of 90° F. without losing vitality, if the air is dry. *Tubercle bacilli* after being dried for three or four months may still be alive. Other microbes have been known to endure a tropical temperature in dry air for as much as three years. This endurance of heat and dryness is comparable to that of some of the lower animals. For instance, the anguillula has been found alive after two years desiccation; rotifers after four years, and some eel-worms after 30 years. The ability to endure cold has already been mentioned.

The action of electricity on microbes has been very little studied. Experiments show that the electric current is detrimental, and it is known that after a thunder-storm the microbes in the air are fewer than at any other time. Light is beneficial to some, detrimental to others. The same as to gases. Microbes which require free oxygen are called aërobic; the others anaërobic; but all require oxygen in some form. Compressed oxygen diminishes or destroys their vitality.

The condition of not being susceptible to infectious disease is called immunity. It is either *natural* or *acquired*. Some microbes will produce disease in some animals and not in others. The bacilli of anthrax will cause the disease in sheep and in man, but not in cats, dogs, or pigs. The bacillus of septicæmia, or what is commonly called blood-poisoning, will produce the disease in house-mice, but not in field-mice. These are cases of natural immunity. The acquired form is shown when an animal has an infectious disease, recovers, and then for a longer or shorter time it is not sus-

ceptible to another attack. The theory is that the microbes have consumed some element in the body which is essential to their growth and development. The body is, therefore, unfit to sustain a second crop, the soil is exhausted; and until this absent condition is restored the body is protected against another seizure of the disease.

Again, this constituent may be exhausted by a microbe which is less vigorous and destructive than the one which causes the disease, and, if this is done, then the introduction of the more vigorous one will fail to find anything to grow upon, and the individual is thus protected. This is the explanation of vaccination. The *attenuated* virus is a protection against the more poisonous virus.

This theory of *exhaustion*, as it is called, does not explain all the facts in the case; and the *antidote* theory of Klebs explains them more fully. His theory supposes that the microbes produce a substance which is poisonous to themselves in case they should reënter the same person at a subsequent time. There is some direct evidence in support of this theory.

The acquired form of immunity may be subdivided into that of acclimatization and that of inoculation.

People of tropical climates are less susceptible to the malarial fevers, etc., of their country than are strangers. This is acclimatization.

Vaccination, or protective inoculation, is the introduction into the system of a milder or weaker virus than that which produces the disease. In this way it is a protective in small-pox, yellow fever, splenic fever, chicken cholera, hydrophobia, swine fever, cattle plague, acute septicæmia, etc. There is no such protection, however, in such diseases as tuberculosis, pneumonia, erysipelas, malarial fever, relapsing fever, and breakbone fever. I have included tuberculosis here because I do not think, as yet, the inoculation of tuberculin, the modified virus of tuberculosis, has been proved to be a protection against the disease. In erysipelas, pneumonia, etc., one attack of the disease, so far from being protective against another, appears to increase the susceptibility.

The proportion of deaths from small-pox in 1,000 deaths from all causes is one-twentieth now what it was before vaccination was introduced. Deaths from splenic fever are one-twenty-fourth what they were before inoculation of the attenuated virus was practiced, and in hydrophobia, one-twenty-third. Some work has been done in inoculating against diphtheria.

I must pass over the discussion of how this milder virus is obtained and say something about germicides or microbe-destroyers; also called necrophytes. Two expressions are used in this connection which need to be explained. The word *antiseptic* is used, meaning *against poison.* Anything that retards or prevents the development of a poison is antiseptic. The same substance, if used in sufficient strength, may become an actual destroyer of germs. This we call a *germicide.*

There are many chemical agents which are antiseptic and germicidal. It would be very desirable, so far as microbe diseases are concerned, to be able to introduce into an animal, its blood, etc., this destructive chemical agent. The difficulty, however, is to use such germicide in sufficient strength to destroy the microbe and yet not injure the patient. It would be the height of therapeutic success if we could inject into the blood by means of a hypodermic syringe a little appropriate fluid and so stop the progress or prevent the development of an infectious disease—say, typhoid fever—by killing the microbes; or when the disease is caused by a poisonous alkaloid or special ferment, it would be desirable to neutralize these by some chemical agent and thus abort the disease. The destruction of the microbes in the first instance would, of course, prevent the formation of the alkaloids or ferments. I mention only a few of the more prominent of these microbe-destroyers.

The salts of mercury, especially the mercuric chloride or corrosive sublimate. A solution of this salt, one part in 1,000 to 5,000 of water, will destroy the most resisting organism in a few minutes. There is a difference of opinion as to whether such solution will destroy the spores, although the weight of evidence seems to favor the opinion that it will. This salt has been and is still very extensively used in surgery, midwifery, and ophthalmia of the new-born.

Iodine is a germicide and has been used hypodermically in splenic fever. In consumption also it has been used to diminish the number of bacilli and prevent the formation of spores, though its inhalation causes irritation and cough.

Sodium chloride, common table salt, is said to destroy the comma or cholera bacilli, but the microbes of typhoid fever, tubercle, cattle plague, etc., may remain in common salt for months without losing the power of growth and reproduction. The salting of meats, therefore, may be ineffectual in preventing the development of pathogenic microbes.

Sulphuretted hydrogen destroys the bacillus tuberculosis and is

poisonous to nearly all other microbes. Dr. Bergeon and others have used this gas in consumption by injecting it per rectum. Claude Bernard has shown that gases which are poisonous when breathed may be introduced into the blood in some other way without poisoning. Bauman, a pupil of Liebig, claims to have cured consumption in the early stages by having the patients breathe in rooms in which sulphur was burning. For the first ten days the cough and irritation increased; afterwards the patients rapidly improved.

Free oxygen is germicidal to some microbes. Ozone is found especially in the high regions of the atmosphere and in sea air. Microbes are least numerous in these regions. Ozone destroys microbes, and it is supposed that it does so by decomposing organic matter and setting free the oxygen. The advantages of residence of consumptives in high altitudes, as the Swiss mountains, is partly explained in this way. Oxygenated water acts like ozone.

Air saturated with oil of turpentine is germicidal. There is a popular and seemingly well-grounded belief that the air of a country well wooded with turpentine trees is useful in preventing and curing consumption. Skoda says that moist air with turpentine vapor is useful in gangrene of the lungs.

The salts of quinine destroy both pathogenic and non-pathogenic microbes. They destroy the *bacillus malariæ*. The best salt for therapeutic purposes is probably the hydrochlorate. The dose by mouth must be proportioned to the severity of the case or intensity of the poison. Stanley, in Darkest Africa, took doses of 45 to 50 grains.

The alcohols are antiseptic and germicidal; will arrest the development of microbes and spores; but the spores, once formed, are said to resist strong alcohol for months. The destruction and prevention of putrefactive germs is well shown in the use of alcohol in laboratories of anatomy, pathology, etc.

There are many other lesser germicides which I need not stop to mention. The tendency of the present day is to rely less on disinfectants and more on absolute cleanliness. If we should visit one of our best hospitals we would see the ceilings and walls painted, because it has been found that wall-papers accumulate germs and dust; the paint can be readily cleaned. There are no carpets on the floors nor woolen curtains at the windows, because of the same objection; the floors are painted, varnished, or oiled;

the windows are shaded by shutters or light curtains. Water pipes, closets, and bath tubs are exposed, so that dirt cannot accumulate nor leakage occur without being at once noticed. Gas is replaced by electricity to avoid contamination of the air by the products of combustion. Hot air from a furnace is replaced by hot-water heating, or the air is screened as it enters the building. The water used for drinking and the preparation of food is boiled to free it from possible organic substances that might be hurtful. Every other possible precaution is taken to prevent the introduction of poisonous microbes. The instruments used in operations are made entirely of metal, and can be placed, box and all, in boiling water before using, to destroy all possible germs. The operator keeps himself clean; wears overgarments of linen or some non-woolen material. The subject for operation is handled only so much as is necessary; only a limited number of assistants and spectators may be present. The effect of all this precaution has been to diminish largely the mortality; serious consequences which formerly were not unexpected would now be an opprobrium to the operator and the hospital. Speaking generally, such a place is far better for treatment of sick and injured than any private house, even that of the most wealthy.

The diseases which are known or believed to be caused by microbes, or their products, are about 40 in number. Among them are cerebro-spinal meningitis, chicken cholera, Asiatic cholera, so recently at our doors; dental caries, which is the staff of life to thousands of dentists; diphtheria, erysipelas, glanders, hydrophobia, leprosy, malaria, measles, pleuro-pneumonia, puerperal fever, pyæmia, scarlet fever, swine fever, tetanus, commonly known as lock-jaw from one of its prominent symptoms; tuberculosis, typhoid fever, small-pox, vaccine disease, and yellow fever. These diseases are most dreaded; they decimate populations, and yet are most easily prevented.

In hydrophobia or rabies there is a micrococcus, which, however, has not yet been isolated and cultivated, found in the nervous system.

In yellow fever micrococci are found in the kidneys, spleen, and liver. The disease is worse during the heated term and ceases with frost.

In erysipelas they are found in the lymphatic vessels of the skin.

In small-pox, also in the lymphatics of the skin.

In pneumonia, in the sputa and blood. The disease can be produced in some of the lower animals by spraying the microbes in the animals' cages.

In whooping-cough an oval-shaped micrococcus is found, but has not yet been isolated.

In measles, micrococci are found in the skin, blood, and catarrhal exudations.

In scarlet fever, in the blood, exudations, ulcerated throat, scaling of skin, and in urine; found also in the milk of cows suffering with certain diseases of the udder.

In gangrene there are small oval micrococci.

In cattle plague, micrococci are found in blood and lymphatic glands.

In cerebro-spinal meningitis, in the pus at base of brain and in kidneys.

In puerperal fever, found in endocardium, lung, spleen, kidney, brain, etc. An alkaloid has also been found in the organs of those dead of the disease and in the urine of patients. To prevent the fever, an antiseptic treatment of the lying-in patient should be adopted.

In what is called suppuration the microbe *micrococcus pyogenes aureus* is found.

In septicæmia, micrococci and bacteria are found in great numbers.

In chicken cholera the *bacteria choleræ gallinarum* is found in large numbers in the blood and organs of fowls dead of this disease. A culture injected into the blood-vessels of a chicken or rabbit develops the characteristic symptoms. Guinea pigs, however, are said to have immunity.

In diphtheria a bacillus and an enzyme are found. The bacillus is in the diphtheritic membrane, but not in the blood of diseased organs. The cat, cow, and Guinea pig are liable to the disease if inoculated with the bacillus.

In typhoid fever, the bacillus typhosus; found in Peyer's glands, spleen, larynx, lungs, liver; sometimes in kidneys and urine, and in blood. The disease has been reproduced by inoculating pure cultures. The stools of patients are highly infectious and should be disinfected before being thrown away. Mercuric chloride or ferrous sulphate may be used for this purpose.

In malaria the *bacillus malariæ* is found in the spleen and marrow

in the form of threads and spores. The microbe was first discovered in the soil of the Roman Campagna. It flourishes in marshy districts, deltas, alluvial soils, and banks of tropical rivers. It is found abundantly in the blood in malarial diseases, and is said to be inhaled, but may perhaps be taken up by the skin or stomach. It is wafted by winds, floating about six feet above the ground, and is stopped by mountains and belts of trees. An amœbiform organism has also been found in the blood in this disease; if injected into the veins it gives rise to intermittent fever.

In glanders or farcy the *bacillus mallei* has been found in the lungs, liver, spleen, and nasal membranes of horses, sheep, and men dead of the disease.

In leprosy, the *bacillus leprœ*. The disease is both contagious and hereditary. If the cultures are introduced into the system of an animal they produce the disease. The disease is common in parts of Africa, South America, Southern Asia, and some of the Pacific islands. It is incurable.

In tuberculosis or consumption, the *bacillus tuberculosis* is found in sputum, blood, tissues, urine, etc., and in the tubercles themselves. Inoculated in animals, it produces the disease. The bacillus forms cellulose from the tissue. Not only man, but the cow, goat, sheep, horse, pig, carnivorous animals, fowls, and rodents are susceptible. It grows more readily in animals which are omnivorous or herbivorous. Galtier says that cheese and whey from the milk of tuberculous cows often contain the bacilli. Swine and poultry fed on these dairy products often develop the disease. Their flesh in turn may give the disease to man.

The expectorated matter of tuberculous patients is highly infectious, even after having been dry for several months. The bacilli may enter the system by breathing or swallowing, or directly by a scratch or cut. Boiling milk and thorough cooking of meats of animals suspected of having the disease destroy the bacillus. Persons suffering with the disease should sleep by themselves, for many have contracted it by occupying the same bed with a patient. All causes which weaken the constitution increase the susceptibility and hasten the progress of the disease.

In anthrax or malignant pustule or splenic fever the *bacillus anthracis* is found in blood and tissues of animals, and causes the disease. Those who handle the hides, wool, or hair of animals dead of the disease are liable to contract it, either by breathing the

spores or by a wound in the skin. The animals should be cremated. It is said that the bites of fleas can carry the infection. Animals grazing on the land previously occupied by diseased animals are liable to be infected.

In swine fever a bacillus is found in lungs, spleen, liver, intestine, and serous membranes of pigs dead of the disease. Inoculations of pure cultures produce the disease in those susceptible, as pigs, rabbits, mice, and pigeons. It may be so cultivated as to be modified. When this modified form is inoculated the animals become proof against a fatal attack.

In Asiatic cholera the *bacillus choleræ* or *comma bacillus* is always found in the rice-water stools of patients sick or dead of the disease.

In tetanus, bacilli which produce spores. These inoculated in mice and rabbits reproduce the disease.

Yellow fever spreads by means of moist winds and human intercourse. Water and soil seem to have nothing to do with it. It prevails in plains near the sea-coast and along the course of great rivers.

Cholera follows the course of rivers. A moist atmosphere and soil are necessary. Moist winds are the great agents of distribution. Troops, pilgrims, and emigrants spread the disease far and wide.

Malarial diseases are more prevalent in moist than in dry weather. Moisture in the soil is necessary to their production; clayey, loamy, marshy soils favor the development. In marshy districts the larger the amount of organic matter in the soil, the greater the amount of malaria. The lower the level of the country, the more prevalent the disease, although in Central Africa a height of 2,500 feet is not free from it. Air, water, and food may convey it.

In conclusion, I would remark that the discovery of these microbes, the study of their life history and products, and their causative and other relations to disease have done much to simplify treatment. Generally speaking, these diseases run a definite course, which can be but little, if at all, shortened by any treatment. The treatment is, therefore, directed towards making the patient comfortable, keeping up his strength, preventing complications, controlling his personal hygiene and his surroundings, and in other ways avoiding death and promoting recovery. This is the true idea of cure, which is to take care of. The mortality is much lessened; the consequences are much less serious.

GEOGRAPHIC NOMENCLATURE OF THE DISTRICT OF COLUMBIA.

A REPORT.

In considering a system of nomenclature it is essential to remember that a name may be a description or a mere label. Originally all or nearly all nouns were descriptive, conveying in concise form some idea of the distinguishing peculiarity of the thing named, so that one who had never seen the object could still know something of its nature from hearing its name. In primitive languages nouns still retain this characteristic, and can usually be resolved by analysis into their adjective and verbal elements. This is true in a less degree of the early Greek and Latin, but age has sapped the blood of our words until they have largely become mere arbitrary symbols. The change has come alike upon common nouns, zoologic and botanic names, and personal and geographic names. Without going into a detailed argument, we may assume that where individuality exists it may be expressed in the name, but where all things are alike a mere label is sufficient. The streets and alleys of a city, with their straight lines, level pavements, and rows of brick walls, are practically alike, but in the country every hill and every running brook has its own separate individuality.

Street and Alley Names.

With regard to names for streets and other city thoroughfares there is an evident advantage in having the name indicate the relative position, and the most obvious method of accomplishing this is by means of a system of nomenclature which is numeric or alphabetic or both. The numbers may run on indefinitely, but the alphabet has a limit, so that if an alphabetic system be adopted it is necessary to start a new series when the streets go beyond twenty-six.

Washington, as originally laid out, consists of four sections, with the Capitol in the center. North and South Capitol streets form the dividing line between the eastern and western portions, while East Capitol street and a theoretic West Capitol street running through the Mall separate the northern and southern portions. The

four sections, which are designated respectively as northwest, northeast, southeast, and southwest, are very unequal in extent. The original District was a tract of ten miles square on both sides of the Potomac, taken partly from Maryland and partly from Virginia. The Virginia portion, extending along the river from the Chain bridge to Alexandria, was afterward retroceded, thus cutting off about one-fourth this area. As originally planned, the site of the Washington monument was the center of the District, whereas by this change it is now on its southwestern limit, the Potomac river. The streets within the city are laid out at right angles, crossed by avenues running diagonally; and, by a recent ruling of Congress, as the city grows these streets must be extended upon the same lines, wherever possible, to the limits of the District. Therefore, whatever system of street nomenclature is adopted within the city must be one that can be adapted without change to the requirements of its future growth as here indicated. Briefly stated, it is possible for the future city of Washington, according to the present delimitations of the District, to extend from six to seven miles north, east, and west from the Capitol. The southwest is cut off by the river and can expand no farther, while the southeast, including Anacostia, is capable of a limited expansion toward the south.

Under the present system the streets are numbered east and west from the Capitol and lettered north and south from the same starting point, while the diagonal avenues are named from states of the Union. Thus we have two series of numbered streets—First street east and First street west, etc., and two series of lettered streets—A street north and A street south, etc. It is necessary always to specify the section as well as the street—as 215 D street northwest—which is a disadvantage, but is rendered necessary by the quadruple plan of the city. On the whole, the system is simple and convenient, besides giving opportunity for future growth, and the problem now before the District Commissioners is how to extend it to the new streets to be laid out beyond the present city limits.

The numbered streets run out to Twenty-third east and to Thirty-seventh west (in Georgetown), and as future parallel streets can be numbered onward consecutively we may consider the numbered streets provided for. In this series, however, we find a few short streets, running each only two or three squares and called by fractional names to indicate their relative position, as Four-and-a-half street, Thirteen-and-a-half street.

The system of naming the diagonal avenues after States of the Union is entirely satisfactory, and as there are a sufficient number of States to furnish names for all future avenues we may also dismiss the avenue question. As the avenues intersect at all angles, there can be no rule by which the name shall indicate the position. It might be better if Florida avenue were divided at Seventh street, making two avenues under different names instead of one as at present, at the same time straightening the western portion as far as practicable toward Seventh street at one end and Massachusetts avenue extended at the other, so that this portion might be approximately parallel with New York and Rhode Island avenues, while the eastern portion would be approximately parallel with Massachusetts, Pennsylvania, and Virginia avenues.

We come now to the most difficult problem in street nomenclature—the naming of the present (lettered) streets running east and west and of future streets to be laid out parallel with them. Before going into this matter let us define the various classes of streets as recognized or contemplated by the Commissioners.

In the first place, the broad thoroughfares running diagonally through the city are called *avenues*. Next, the thoroughfares crossing each other at regular intervals in either direction are called *streets*. Then we have shorter streets, running perhaps for a square or two, midway between the longer streets of the regular series. Some of these are at present called streets, as "Corcoran street;" others are known as places, as "Grant place." It is proposed by the District Commissioners to distinguish all these as *places*, giving to them at the same time such names as will indicate their position with relation to the regular lettered series. The present "Grant place" is a good illustration of the proposed method. The title *place* indicates that it is a short street intermediate between two of the regular series, while the name *Grant*, beginning with G, shows that it is next to G street. The short streets in the numbered series would take fractional names, as Four-and-a-half street, Thirteen-and-a-half street, or might better be called "places," to agree with the nomenclature of the short streets in the lettered series, and could be designated by numbers corresponding with those of the streets next following—*e. g.*, Fifth place, Fourteenth place, etc. We have still a fourth class of inhabited city thoroughfares, viz., alleys, which by the growth of population have come to be tenanted by families of the poorer class and are now practically smaller streets. Many of them

are now well paved and built up with good houses. It is proposed to designate these as *courts*, reserving the name *alley* for the smaller thoroughfares, which are used as passages but not for residences. In the renaming, most of these courts will become places, so that the choice of names for the few remaining will be a simple matter. It should be noted that when two or more places are on the same line, even though the continuity is broken by intervening solid squares, they will be called by the same name. Within the present city limits the initial letter of a "place" would naturally be the same as the letter constituting the name of the regular street immediately following it. Future streets should be laid out at such convenient intervals as to render shorter "places" unnecessary. Uninhabited alleys can be designated by means of the nearest streets. The poor will thus be relieved of the necessity of considering themselves as mere alley refuse, and we shall be rid of the abominable names which now disgrace our city directory, and which are derogatory to the dignity of manhood, for though good may come out of Nazareth, it is hard to imagine it as coming out of Bedbug alley.

On August 27, 1888, Congress approved "An act to regulate the subdivision of land within the District of Columbia." The most important section of this bill is section 5, which provides that "No future subdivision of land in the District of Columbia, without the limits of the cities of Washington and Georgetown, shall be recorded in the surveyor's office of the said District unless made in conformity with the general plan of the city of Washington." As a result of this the District Commissioners, on December 6, 1888, issued a series of "General Orders" in regard to streets and subdivisions in the District. These orders embody the fruits of careful study of the question by practical men familiar with the requirements of the case and the difficulties to be overcome. The sections which bear most upon the point at issue are as follows:

7. No subdivision of land outside the cities of Washington and Georgetown will be approved unless the streets and avenues therein conform as far as practicable in width and general direction to the same streets and avenues in the city of Washington.

8. Whenever practicable, streets and avenues will be in exact alignment with the streets and avenues of the city of Washington and of equal width.

20. The names of all avenues, streets, circles, and public spaces will be subject to the approval of the Commissioners.

21. The following scheme for naming these will be adhered to:

22. The broad diagonal highways will be designated as avenues and will be named after the States of the Union.

23. Streets running north and south will be numbered each way from the meridian of the Capitol. If the streets are not direct continuations of the city streets, their names will correspond with the city streets most nearly due north or south of them.

24. Streets running east and west will be named from the letters of the alphabet until these letters are exhausted. Beyond this they will be named after the principal cities of America, the names of which commence with the letters of the alphabet in their proper order of rotation, as Albany street, Baltimore street, Chicago street, Detroit street, etc., etc. When the alphabet is thus exhausted the succeeding streets will be named for the principal rivers and lakes of America, the names of which commence with the letters of the alphabet in proper rotation, as Albemarle street, Brazos street, Champlain street, Des Moines street, etc.

25. Streets not in exact alignment with those to the east or west of them will take the names of those streets most nearly in the line of their direct continuation.

26. Small streets which do not form an essential part of the rectangular system of streets will be designated as "places," and will receive such names as may be approved by the Commissioners.

27. No two streets, avenues, or places in the District of Columbia shall have the same name.

28. Circles and other public spaces will be named after distinguished Americans who have been prominent in the service of their country.

We have here provision for three alphabetic series of street names, viz., letters, American cities, and American lakes and rivers, sufficient to furnish names for possible streets as far out to the north as a line drawn west from Takoma Park station, leaving about ten or twelve possible streets beyond unprovided for. The lettered streets as now existing end with W, at Florida avenue, omitting J, which is discarded on account of its resemblance in manuscript to I. The letter series, however, although of long standing, has many enemies on account of its baldness. One writer, in a letter to the Commissioners on this subject, refers to it as "utilitarianism run mad."

As far back as 1886 a bill had been introduced into the Senate proposing to substitute for letters two alphabetic series of names of distinguished Americans, taking for the north the names of statesmen and for the south the names of commanders in the army or navy. Thus, for A, B, C, and D streets it was proposed to substitute Adams, Benton, Clay, and Douglas streets.

More recently a plan was proposed for distinguishing the lettered streets south by names of women. The list started off very well

with Bertha, Diana, and Florence, but when it got down to Kathleen, Ophelia, Priscilla, and Sophia the originators of the scheme fled in horror from the thing they had created.

Still another plan, now under contemplation, is to use letters only to designate the short "place" streets already referred to, having the letter in each case to correspond with the initial of the name of the parallel street immediately preceding it,* and to use for all other streets running east and west different series of alphabetical names sufficient to furnish names for all such possible streets to the bounds of the District. It is proposed to stop at W, the remaining letters being difficult to handle, and to have distinct series north and south of the central line of the city. This would necessitate seven alphabetic series or parts of series of names, four north and three south, of which it is contemplated that the first, north, shall consist of the names of distinguished Americans, to take the place of the present letter names; the second to be names of American cities, the third American rivers and lakes, the fourth or partial series unprovided for. For the letter names south the scheme contemplates, first, a series of tree and plant names instead of the present letter names, to be followed by another series and a fractional series unprovided for to extend to the southernmost corner of the District.

It is claimed that this arrangement would discriminate at once between north and south, and thus obviate the need of the N. or S. in letter addresses, while it would also show how far from the center any point might be located. The objections to it, however, are fatal. We cannot get rid of the E. and W. in letter addresses, and experience has shown that there is greater liability to forgetfulness where only one letter is used than when two must be considered. There is no good reason why we should have different series north and south when we have only one system of numbers east and west, and are consequently obliged to take the sectional abbreviation constantly into our calculation.

It is practically impossible to formulate seven alphabetic series of names that shall be entirely distinct and otherwise satisfactory and not be forced and ridiculous in places on account of the very limitations of the case. Certain letters do not fit well in alphabetic series,

* It would be preferable to designate places by the names of the next *following* streets in order to avoid the difficulty of naming the places below A and First streets.

while for certain other letters there are always a number of candidates equally worthy of a place. This is especially true of any alphabetic series of "distinguished Americans." Under certain letters there is a redundancy of candidates, all equally deserving of commemoration, while under other letters it is impossible to find names, excepting those of persons so obscure as to be practically unknown. It is absurd to commemorate a man simply because his name chances to begin with a K or a V. The circle and other park monuments are the proper mediums by which to commemorate our great men, and this distinction should be reserved for those who are really great, and as there is always a wide diversity of opinion in such matters, the honors should be awarded only by a national legislative body. We may suggest that men who have enriched our country by their writings, explorations, and inventions as much deserve monumental honors as our generals and politicians.

A modification of the "distinguished American" plan proposed was to have four such series, one for each section, so that the name should indicate the section without the addition of a suffix. To accomplish this it was intended to have one series consist of names of military commanders, another of naval commanders, a third of statesmen, and a fourth of authors, inventors, etc. The objection to this is that it assumes for our entire population, including those of foreign birth, a knowledge of American biography possessed by few even of our educated citizens.

As the sectional system of street distinction entails certain unavoidable difficulties, it may be asked why it is not better to get rid of it entirely by numbering the streets in a single concentric series from east to west of the District, and using some different series in the other direction in regular succession from one boundary to the other, instead of making every series start from the Capitol as a central point? The answer to this is that we must make provision for the possibility, and even probability, that at no very distant period the Federal city will cover not only the whole of the present District, but a great part of the adjoining territory. Artificial boundaries cannot confine the growth of a great city, still less of a national capital, and we may look forward to the day when the numerous suburban villages springing up all around Washington will form parts of one great whole under Federal jurisdiction. A system of street nomenclature which makes the Capitol the starting-point is the only one adapted to meet the possibilities of such future

growth in every direction. Whenever the time comes to readjust the District boundaries the lines should coincide with the direction of the cardinal points, which is not the case at present.

Another proposition is to discard the alphabetic system entirely and use a numeral system instead, calling the streets running north and south First street, Second street, etc., as at present, and calling those at right angles with them First avenue, Second avenue, etc., to the limits of the District. This plan possesses the merit of extreme simplicity, and enables the stranger at once to ascertain his distance from a given point, which he cannot do under a system made up of several alphabetic series without knowing the order of the several series and making an intricate calculation in addition. For instance, he would know that the distance from Fourth avenue to Fortieth avenue was 36 squares north or south just as certainly and readily as he would know that from Fourth street to Fortieth street was 36 squares east or west, whereas to know how far Maple street might be from Atlanta street he would have to know the proper arrangement of the alphabetic *city*, *river*, and *tree* series, and then perform an intricate operation in subtraction and addition upon the three series to get the distance. This plan overcomes the practical difficulties in the way of inventing and arranging alphabetic series—difficulties which increase with each successive series demanded—and is capable of unlimited extension without change to accommodate any future growth of the city. It is in practical operation to a limited extent in the great commercial city of New York. The liability to confusion between the numbered streets and the numbered avenues is not as great as the liability to confusion under four or more different alphabetic systems. The State names applied to the diagonal avenues sufficiently indicate their distinctive character.

The committee would suggest the retention of the present system of duplicate numbered streets running north and south and of the present existing duplicate lettered streets running east and west, and that all streets running parallel with the present lettered streets be known in future as numbered avenues, beginning with First avenue and continuing in regular succession. Possibly it might be wiser to begin with Twenty-third avenue, in order to more readily extend the system of the present lettered streets, should such a course ever seem desirable.

It would be unwise to lengthen the names of the present lettered

streets. Besides the confusion which such a wholesale change would necessarily entail for a long time, the present simple letter names are the shortest that can be devised, and any other series would require a constant additional expenditure of valuable time in addressing letters and indicating locations. The difference to a business man between writing a single letter of the alphabet and writing a whole word of eight or ten letters every time he has occasion to address a correspondent is something considerable in a few days or a week, and when we extend this difference to a whole city, with its population of a quarter of a million, it becomes enormous.

If the adoption of a system of numbered avenues beyond a parallel with the present lettered streets should appear impracticable, the committee would suggest as an alternative duplicate alphabetic series of names for such streets running east and west beyond W street, the first series to consist of names of American cities, the second of American rivers, lakes, etc., and the third (partial series) of names of trees and plants. This is sufficient to furnish names for all such future streets to the present limits of the District, and the system may be extended if circumstances in time to come should demand it. The duplicate system conforms to the present method in use for both numbered and lettered streets, and abbreviates the necessity for too great multiplicity of series. In a system of city nomenclature based upon the alphabet there is a logical reason in beginning with the alphabet itself and proceeding successively to cities, next to natural geographic features, and then to natural productions.

We may now consider the essential requisites of the names to be selected. The chief requirement is that they shall be such as can be readily pronounced, or written upon a letter address, without unnecessary labor or loss of time or liability to error; therefore they should be smooth sounding, reasonably short, and the spelling should indicate the pronunciation according to the ordinary rules of English orthography. This last proviso would bar out such names as Agassiz, Des Moines, and l'Enfant, however much we might desire to commemorate the originals. Double names, such as New Orleans or St. Clair, are also to be avoided. K, N, Z, and U are always difficult letters to fill in an alphabetic series, and consequently there is little room for choice where they are concerned.

The following lists of names are submitted for the several series proposed:

First Series.—Letters of the Alphabet.

The present system of letters of the alphabet from A to W, omitting J, to remain unchanged.

Second Series.—American Cities.

In 1889 the following series of city names was prepared in the Engineer Department of the District Office:

Albany.	Joliet.	Savannah.
Baltimore.	Keokuk.	Trenton.
Cincinnati.	Lowell.	Utica.
Detroit.	Milwaukee.	Vallejo.
Emporia.	Newark.	Wilmington.
Frankfort.	Omaha.	Xenia.
Galveston.	Philadelphia.	Yuma.
Hartford.	Quincy.	Zanesville.
Indianapolis.	Richmond.	

To this list, which runs out to the end of the alphabet, there are several objections. Cincinnati, Indianapolis, and Philadelphia are too long, Newark is too nearly like New York, and Savannah is the name of a river as well as of a city. Lowell and Quincy are liable to be confounded with any series of "distinguished Americans" that might be adopted. The long sound of U in Utica is objectionable on account of its resemblance to *Yu*, and Vallejo is liable to mispronunciation.

For this series we would suggest the following:

Atlanta or Albany.	Iola or Iuka.	Quebec.
Baltimore.	Joliet.	Richmond.
Charleston or Chester.	Kingston.	Salem or Springfield.
Detroit.	Lansing or Louisville.	Toledo or Topeka.
Emporia.	Monterey or Montreal.	Urbana.
Frankfort.	Newport or Nashville.	Vandalia or Vicksburg.
Galena or Galveston.	Oakland or Omaha.	Wilmington.
Hartford.	Portland.	

Third Series.—American Rivers, etc.

Albemarle.	Itasca.	Roanoke.
Biloxi.	Juniata.	Sciota or Santee.
Chesapeake.	Kennebec.	Tahoe or Tallapoosa.
Dolores (in Colorado, 250 miles long).	Lehigh.	Ungara (in Labrador) or Umatilla.
Erie.	Miami.	Vermilion.
Fresno.	Niagara.	Wabash.
Gasconade.	Ontario.	
Huron.	Potomac.	
	Quinebaug.	

Fourth Series.—Trees and Plants.

Azalea or Aspen.	Grape or Goldenrod.	Maple or Magnolia.
Buckeye or Beech.	Holly or Hazel.	Nopal.
Chestnut.	Ivy.	Oak or Olive.
Dahlia or Dogwood.	Juniper.	Poplar or Pine.
Elm or Elder.	Kalmia.	
Fern.	Laurel or Linden.	

As these are sufficient to name all the streets of this series, the list need not be carried farther.

Circles.

In addition to the existing circles at the intersections of avenues within or adjacent to the present city boundaries it is intended to have similar small reservations, of circular, elliptical, or other convenient shape, at the intersections of all avenues to be laid out within the District in the future, and also at the points where the avenues shall meet the future avenue or boulevard which is intended to form the boundary of the District on its three land sides. It is intended that each of these small reservations shall ultimately be the site of a monument erected in honor of some distinguished American, as is already the case with many of the existing circles. These reservations will naturally be known by the names of the personages commemorated by the monuments erected upon them, in continuance of the existing custom. As state names are reserved for avenues, the name of Iowa circle should be changed to conform to the regular plan of circle nomenclature.

Bridges.

There is no reason why the name of the Aqueduct bridge should be changed, as has been urged, to Free bridge. The present name is the more euphonious as well as the more distinctive, for all bridges within the District are, or should be, free. The Long bridge must always remain as it has always been, distinctively the long bridge. In other cases bridges should be named from the roads of which they are a part or the streams which they span. In naming bridges over small streams within the parks, a bridge across Cascade run or Ivy brook might appropriately be called Cascade bridge or Ivy bridge instead of Cascade Run bridge or Ivy Brook bridge, and so on.

Suburban Roads and Villages.

It is unnecessary to plan an elaborate system of names for the suburban villages and roads of the District, as with the growth of the city the villages will be absorbed, while most of the roads will be made to conform more nearly to established city thoroughfares, the names of which they will then assume, or will be wiped out altogether. In the meantime, a few suggestions are in order.

Regular thoroughfares outside of cities are commonly known as turnpikes or pikes, roads, and lanes. A turnpike or pike is simply a road along which at intervals are erected turnpike gates at which toll is collected for the privilege of passing over the road. The term lane implies something more hemmed in and narrower than the ordinary road, and in this sense is frequently used to denote a passageway leading up from the main road to a country residence. There is a pleasant suggestion of fresh flowers and green hedge-rows in the name that renders it peculiarly appropriate for use in connection with a number of driveways that may hereafter be laid out in the Zoological or Rock Creek park. The smaller park roadways, too narrow to permit the passage of vehicles, may appropriately be designated as paths or walks, both names alike having an agreeable woodland flavor.

Pikes and other country roads are usually known by the names of the principal towns, streams, or other features along their lines, as the Bladensburg road, Broadbranch road, Piercemill road, etc. Many of our District roads, following the old colonial fashion, take their names from the early proprietors of the estates through which they ran, as the Carroll road, the Blair road, and so on. Theoretically the name of a road should indicate its objective point or general direction, but this is not often practicable within the District, owing to the irregular configuration of the surface.

Road names, like those of streets, should be reasonably short and not liable to mispronunciation or apprehension, and to avoid redundancy those roads which are approximately continuous along the same line should have the same name. In accord with this idea several changes might be made with advantage.

Loughboro road.—This name is liable both to mispronunciation and misreading. On one map it appears as Longboro. The name does not indicate the terminus or direction of the road and should

be discarded and the road considered a part of the Ridge road or of the other of which it is a continuation.

Foxall road.—This is another name for the Ridge road (west). On one map it appears as Fox Hall. Two names are unnecessary. It would be better to restrict the name Foxhall to the part below the New-Cut road.

New-Cut road.—Compound names are objectionable. It would be better, if possible, to select a simple name which would not suggest a time period.

Woodley-Lane road.—The name is tautologic. To conform to the general system, it should be called Woodley road.

Quarry road.—This road was so called from the former quarry at its terminus on Rock creek. As it is now the main thoroughfare to the Zoological park, it might appropriately be called the Park road.

Linnean-Hill road should be abbreviated to Linnean road.

Military road.—There are two roads of this name, a fact which sometimes leads to confusion. Some other name should be given to one of the two.

Rock-Creek-Ford road.—This road is practically abandoned and the name should be dropped from the maps.

Rock-Creek-Church road.—This name is too long, besides being liable to be confounded with that of the obsolete road last mentioned. As the old church from which it takes its name has now no apparent connection with the creek, it would be better to call this simply the Church road.

Fourteenth-Street road.—As this road bends around until it runs into Seventh street at Brightwood, the name is inappropriate. Beyond Brightwood its most direct continuation is the Piney-Branch road, which as at present defined is entirely cut off from Piney branch, while "Fourteenth-Street road" crosses this stream. It would be better to consider both as constituting one road under an appropriate name beyond the bend from the direct line of Fourteenth street. The name Piney road is suggested.

Brightwood avenue.—If this road is to be considered a continuation of Seventh street, it should be called Seventh street or, for the present, Seventh-street road. If it is to be an avenue it should be named from a state, in accordance with the general plan.

Columbia road.—This is now practically within the city and should be called either an avenue or a street, with a name to accord with the general plan. The present name is, moreover, a duplication, having also been sometimes applied to the Bladensburg road.

Bladensburg road.—As just stated, this has also been called Columbia road and is so marked on some maps. The first name is better for several reasons and should be officially adopted.

Queen's Chapel road.—This name would be better as one word without the apostrophe.

Ridge road (east).—This name, applied to a road east of Anacostia river, is a duplication of a name given to another west of Georgetown. To avoid confusion, one of them should be given a different name.

Eastern Branch or Anacostia road—should be simply Anacostia road.

Columbia boulevard.—This would seem the most appropriate name for the future grand avenue or boulevard to form the boundary of the District of Columbia on the three land sides, leaving the Potomac as the boundary on the fourth. It is to be supposed that the character of the road will justify the use of the term boulevard.

Streams, Elevations, and Country Seats.

Streams (natural) are variously designated as rivers, creeks, branches, forks, runs, or brooks, according to size or local habits of nomenclature. A river is commonly understood to be a stream of the largest size, and a brook one of the smallest, while creeks, branches, or runs are understood to occupy intermediate positions. There is, however, no fixed line of demarcation, and the use of the terms is largely indiscriminate and varies according to locality. In the West a creek may be defined as a stream of the second class—*i. e.*, a stream somewhat smaller than what would be known as a river in the same neighborhood—while in tide-water Maryland and Virginia the term is commonly used to denote a tidal estuary. In the West also the term branch is but seldom used, creek or fork taking its place, while the term run is practically unknown.

When names are made official, however, there should be a system. The Potomac is universally recognized as a *river*, and the stream formerly called the Eastern branch is now also officially designated

as a river, the Anacostia. The more important tributaries of these rivers may be designated as creeks; lesser tributaries and the principal tributaries of creeks may be called branches, and streams of the smallest size may be distinguished as runs or brooks. Thus we have *river*, *creek*, *branch*, and *run* or *brook* as designations for four classes of streams, from the largest to the smallest, that need be indicated upon an ordinary map. For illustration, a brook flows into Piney branch, which in turn flows into a larger stream, Rock creek, and this flows into the largest stream, the Potomac river.

A few of the streams within the District have recognized names which may well stand, only making the designation conform to the system indicated, where this is not already the case. A number of others have been named by Prof. Lester F. Ward in accordance with their botanic or physical characteristics, and some of these names appear on a map printed with his work on the District flora, published by the Smithsonian Institution in 1881. Many of them are in every way appropriate and may well be adopted. For other streams names may be selected from the lists herewith appended. It might be well also to commemorate in this manner some of the early explorers of the region when the names are sufficiently distinctive.

A few prominent ridges and other elevations should have names, but it is unnecessary to go very far in this direction, in view of the probability that with the extension of the city streets nearly "every valley shall be filled and every mountain made low." Every hill formerly crowned by a fort should be called by the name of that fort, if the hill itself is to remain, as Stevenson hill, Bunker hill, etc., and the historic fact should be further commemorated by an inexpensive monument. Many names will be suggested by the particular characteristics of the place. For the rest selections may be made from the appended lists.

Villa sites will be named according to the tastes of their owners, and this part of the subject is hardly a matter for official notice. In most cases the good sense and refinement of this class of proprietors may safely be trusted to work out pleasing results. To those in need of suggestions the appended lists offer a wide range for selection.

A few miscellaneous local features, such as springs, ponds, level stretches and bends in streams, will need names, especially within the Zoological and Rock Creek parks. We have nothing within the District which can be called a lake, but custom has made the term appropriate for artificial ponds in public parks. The word is

also euphonious on account of the liquid *l*. For such small bodies of water the terms *lake* or *pond* may be used. *Cliff*, *bluff* and *promontory*, *cascade* and *falls* are all appropriate in their places. *Grove*, for small bodies of timber in parks, etc., is better than forest or wood.

In every case the geographic name should be euphonious, and not too long, and where it has a meaning the idea conveyed should be pleasant and appropriate. To be most euphonious a name should consist of a regular succession of vowel and consonant or liquid sounds without redundancy or awkward combinations of either; the elemental sounds themselves should be euphonious, and in words of more than two syllables the accent, as a rule, should fall on the last syllable or the penult. The liquids *l*, *n*, and *r* tend always to euphonic effect. Botanic and biologic terms from the Latin and Greek are almost always euphonious and may appropriately be used when not too long. The Powhatan language, formerly spoken by the aborigines of the District and adjacent territory, abounds in musical terms combining the sonorous character of the northern languages with the soft vocalic syllables of the south. Rappahannock, Susquehanna, Potomac, Chesapeake, Roanoke, Powhatan, tomahawk, and moccasin are all from this language and show the character of its phonology. Philologic, ethnologic, and antiquarian considerations demand that we should preserve what remains of the names and language of our aborigines, and there can be no more practical way of accomplishing this result than by conferring these names, whenever appropriate, upon the streams and hills within their ancient domain. Names indicating the fauna and flora of the District are also peculiarly appropriate, either in the scientific or the popular form, as well as names based upon geologic features, etc., as Mitella run, Mistletoe valley, Snowbird spring, Firefly ridge, Mica bluff, etc. It would be obviously out of place to use the names of plants or animals not native to the District, or the names of the larger animals, which have been so long extinct in this region as to be practically foreign to it. A number of appropriate names will also be suggested by the picturesque character of the country. A few old homestead names from across the water may be retained on account of their antiquarian associations, but as far as possible the District names should be distinctively local and American. Family names for natural geographic nomenclature should be tabooed entirely.

Selected Names from Ward's Nomenclature of the Rock Creek Region.

Rocket run.—Entering Rock creek from the west a short distance above Oak Hill cemetery. So named from the abundance along its banks of the rocket plant (*Hesperis matronalis*), rare elsewhere in the District.

Conopholis ridge.—A high ridge between two streams entering the creek on the same side a little farther up. So named from the abundance of the *Conopholis Americana*. The English names of the plant, cancer root and squaw root, are obviously inappropriate.

Aralia run.—Farther up on the north side of the creek. From the *Aralia spinosa* or Hercules club found growing here and almost no place elsewhere in the District.

Mitella run.—Entering the creek from the north not far below Woodley Lane bridge. From the abundance of *Mitella diphylla* or Bishop's Cap.

Checkerberry bluff.—On the northwest bank of Rock creek, at the great bend near the Holt house and the present headquarters of the Zoological park. So named from the presence there of the *Gaultheria procumbens* or checkerberry.

Mistletoe valley.—The ravine through which runs the Quarry road, which leads to the principal entrance of the Zoological park. So called from the occurrence of the mistletoe on several of the sour-gum trees growing in it, especially on its southern slope.

Violet ridge.—The gravelly ridge between the two branches of the small stream which enters Rock creek from the east near the entrance to the Zoological park. So named from the abundance upon it of the *Viola pedata* or birdfoot violet.

Valerian bluff.—On north side of the creek, near the upper end of the Zoological park. From the abundance here of the *Polemonium reptans* or Greek valerian.

Cascade run.—"Here the Zoological park ends and the Rock Creek park begins, and the fine stream that comes in from the west is my Cascade run, so named from the cascade that it has formed. This is one of the finest natural cataracts in the Rock creek region."

Poplar bottom.—On the left bank, in the bend just below Pierce's mill.

Soapstone run.—A tributary of Broad branch. "From the well-known soapstone quarry" near its head.

Wintergreen ridge.—A ridge or promontory on the north bank of Rock creek near Blagden's mill. From the abundance there of the wintergreen or checkerberry, *Gaultheria procumbens*.

NAMES FROM THE DISTRICT FLORA.

(For convenience the popular and scientific names are arranged in one alphabetic series.)

Acanthus.
Acorns.
Adiantum.
Alchemilla.
Alder.
Aletris.
Alisma.
Allium.
Alnus.
Amaranth.
Amaryllis.
Ambrosia.
Anacharis.
Andrea.
Andromeda.
Anemone.
Anomodon.
Anthemis.
Aphyllon.
Apricot.
Arabis.
Aralia.
Arbutus.
Arenaria.
Arethusa.
Arisema.
Asarum.
Asclepias.
Asimina.
Aspen.
Asphodel.
Aspidium.
Aster.
Azalea.
Baptisia.
Barberry.
Basil.
Basswood.
Bayberry.
Beech.
Bellflower.
Bellwort.
Bergamot.
Betula.
Bindweed.
Birch.
Bittersweet.
Bitterweed.
Blackberry.
Bloodroot.
Blueberry.
Bluet.
Boneset.
Boxelder.
Bracken.
Brake.
Brasenia.
Brassica.
Bromus.
Brookweed.
Bruchia.
Brunella.
Buckthorn.
Bulrush.
Burdock.
Burnet.
Buttercup.
Butternut
Buttonwood.
Cacalia.
Calamintha.
Calamus.
Calla.
Camelina.
Campanula.
Campion.
Cannabis.
Capsella.
Cardamine.
Cardinal (Cardinalis).
Carpinus.
Carya.
Cassia.
Castanea.
Catalpa.
Catchfly.
Catnip.
Cattail.
Cedar.
Celandine.
Celastrus.
Centaurea.
Cerastium.
Charlock.
Checkerberry.
Cherry.
Chervil.
Chestnut.
Chickory.
Chickweed.
Chinquapin (aboriginal).
Chokeberry.
Chokecherry.
Chondrilla.
Circea.
Claytonia.
Clearweed.
Clematis.
Clitoria.
Clover.
Columbine.
Comandra.
Conopholis.
Convulvulus.
Coralroot.
Coreopsis.
Cornel.
Corydalis.
Corylus.
Cowslip.
Crabapple.
Cranesbil.
Cratagus.

Cress.
Crotalaria.
Crowfoot.
Cryptogam.
Cunila.
Cuphea.
Currant.
Cuscuta.
Cynthia.
Dactylis.
Dandelion.
Danthonia.
Darnel.
Datura.
Dayflower.
Deerberry.
Delphinium.
Dentaria.
Desmodium.
Dewberry.
Dianthus.
Dicentra.
Dicranum.
Diodia.
Dirca.
Dock.
Dogbane.
Dogrose.
Dogwood.
Drosera.
Duckweed.
Dulichium.
Eatonia.
Echium.
Eclipta.
Elder.
Eleusine.
Ellisia.
Elm.
Elymus.
Epigea.
Equisetum.
Erianthus.
Erigenia.
Erodium.
Eryngo.
Euphorbia.
Evergreen.
Everlasting.
Fedia.
Fern.
Festuca.
Filago.
Filbert.
Fireweed.
Flax.
Fleabane.
Floral.
Flower, Flowery.
Fontinalis.
Forgetmenot.
Foxgrape.
Fragaria.
Frasera.
Frostweed.
Funaria.
Galingale.
Galium.
Gaultheria.
Gaura.
Gentian.
Geranium.
Gerardia.
Gillenia.
Ginseng.
Glyceria.
Goldenrod.
Gooseberry.
Grape.
Gratiola.
Greenbrier.
Gum tree.
Hackberry.
Hawkweed.
Hawthorn.
Hazel.
Hedeoma.
Helenium.
Helianthus.
Heliopsis.
Heliotrope.
Hemlock.
Hemp.
Hepatica.
Heracleum.
Herpestis.
Hesperis.
Hibiscus.
Hickory.
Holcus.
Holly.
Honeysuckle.
Hop.
Hornbeam.
Horsemint.
Houstonia.
Huckleberry.
Hydrangea.
Hypericum.
Ilex.
Indigo.
Iris.
Ironweed.
Ironwood.
Isanthus.
Itea.
Juncus.
Juniper.
Kalmia.
Lactuca.
Lamium.
Laportea.
Larkspur.
Lathyrus.
Laurel.
Leafcup.
Lechea.
Leek.
Lemna.
Leonurus.
Leptodon.
Leskea.
Lespedeza.
Liatris.
Lily.
Linaria.
Linden.
Lindera.

Liparis.
Liverwort.
Lobelia.
Locust.
Lupinus.
Lycium.
Lycopus.
Maclura.
Magnolia.
Maidenhair.
Mallow.
Malva.
Mandrake.
Maple.
Mariscus.
Maruta.
Mayapple.
Meadowsweet.
Medeola.
Melanthium.
Melastoma.
Melica.
Melissa.
Mentha.
Mertensia.
Milfoil.
Mint.
Mistletoe.
Mitchella.
Mitella.
Monarda.
Moonseed.
Moosewood.
Morning-glory.
Moss, Mossy.
Mulberry.
Mullein.
Mustard.
Myrica.
Myrtle.
Nasturtium.
Negundo.
Nepeta.
Nesea.
Nettle.
Nicandra.
Nightshade.
Nitella.
Nymphea.
Nyssa.
Oak.
Obolaria.
Onoclea.
Orchis.
Orontium.
Osmunda.
Ostrya.
Oxalis.
Panicum.
Pansy.
Papaw.
Pardanthus.
Parsley.
Partridgeberry.
Pastinaca.
Pellea.
Peltandra.
Penthorum.
Peppergrass.
Peppermint.
Perilla.
Periwinkle.
Persea.
Persimmon (aboriginal).
Phacelia.
Phalaris.
Phaseolus.
Physalis.
Pilea.
Pimpernel.
Pine.
Pink.
Pinoak.
Pinweed.
Pirus.
Plantago.
Plantain.
Platanus.
Plum.
Polemonium.
Polymnia.
Pondlily.
Pondweed.
Poplar.
Poppy.
Portulaca.
Postoak.
Poterium.
Puccoon (aboriginal).
Pyrola.
Radula.
Ragweed.
Ranunculus.
Raphanus.
Raspberry.
Rattlebox.
Redbud.
Redroot.
Rhododendron.
Ricinus.
Robinia.
Rochelia.
Rockbrake.
Rocket.
Rose.
Ruel.
Ruellia.
Rush.
Sage.
Salsola.
Salvia.
Samolus.
Sandwort.
Sanicle.
Sanicula.
Saponaria.
Sassafras.
Scapania.
Scleria.
Scutellaria.
Sedge.
Senna.
Service.
Setaria.
Shellbark (hickory).
Silkweed.
Silphium.
Smilax.

Snakeroot.
Snowberry.
Soapberry.
Solanum.
Solidago.
Sorrel.
Spartina.
Spearmint.
Speedwell.
Spergula.
Spicewood.
Spruce.
Stellaria.
Stramonium.
Strawberry.
Sumac.
Sundew.
Sundrop.
Sunflower.
Sweetwilliam.
Sycamore.
Tansy.
Teasel.
Tephrosia.
Thalictrum.
Thelia.
Thistle.
Thorn, Thorny.
Thornapple.
Tilia.
Tipularia.
Tricuspis.
Trifolium.
Trillium.
Trisetum.
Trumpetvine.
Tulip.
Tupelo (aboriginal, southern).
Turkscap.
Twinleaf.
Uniola.
Valerian.
Velvetleaf.
Veratrum.
Verbena.
Vernal.
Vernonia.
Veronica.
Vervain.
Viburnum.
Vinca.
Vine, Viny.
Viola.
Violet.
Walnut.
Watercress.
Waterleaf.
Waterlily.
Watershield.
Waxweed.
Willow.
Windflower.
Winterberry.
Wintergreen.
Witchhazel.
Woodbine.
Woody.
Yarrow.

NAMES FROM THE FAUNA OF THE DISTRICT.

Aquila (eagle).
Bittern.
Blackbird.
Bluebird.
Bobolink.
Butterfly.
Buzzard.
Canvasback.
Catbird.
Catfish.
Chickadee.
Chipmunk.
Chrysalis.
Cicada.
Cowbird.
Creeper.
Cricket.
Crow.
Cuckoo.
Curlew.
Dendroica (warbler).
Dragonfly.
Eagle.
Eel.
Falco, Falcon.
Fieldmouse.
Firefly.
Fishhawk.
Flycatcher.
Glowworm.
Goldfinch.
Grasshopper.
Groundsquirrel.
Hawk.
Heron.
Hirundo (swallow).
Hummingbird.
Hylodes.
Kildeer.
Kingbird.
Kingfisher.
Lark.
Lizard.
Locust.
Mallard.
Martin.
Mayfly.
Minnow.
Mockingbird.
Mouse.
Mullet.
Muskrat.
Nighthawk.
Opossum (aboriginal).

Oriole.
Ortolan.
Owl.
Papilio (butterfly).
Partridge.
Pewee.
Pigeon.
Pintail.
Quail.
Rabbit.
Raccoon (aboriginal).
Redbird.
Redbreast.
Redstart.
Regulus (kinglet).
Robin.
Sandpiper.
Sapsucker.
Skylark.
Snowbird.
Sora (aboriginal? = ortolan).
Sparrow.
Squirrel.
Swallow.
Tanager.
Thrush.
Tomtit.
Trout.
Turtle.
Turtledove.
Vireo.
Wagtail.
Waxwing.
Warbler.
Weasel.
Whippoorwill.
Wren.

ABORIGINAL TERMS FROM THE POWHATAN LANGUAGE.

This is the language of the aborigines formerly inhabiting the District and adjacent territory. The terms are taken from Strachey, Smith, and other early writers, the spelling being modified to conform more nearly with modern English orthography and phonetics.

Accohican—"to make a dish."
Accondu'—"blue berries of the bignes of grapes, very pleasant."
Ahshaha'm—lobster.
Ana'usecoon—"a reed mat."
Anascomin—acorn.
Anath—farewell.
Aotaw'k—rat.
Apegwu's—mouse.
Apoca'n—pipe.
Aposon—"a beast in bignes like a pig and in tast alike" (opossum).
Appoans—bread (pone).
Aquataneek—a green tree.
Aquinta'n—a boat.
Aracu'n—"a beast like a fox" (raccoon).
Arrokoth—the sky.
Asaqueth—"the clay they make pipes of."
Ascamunk—eel.
Aspamu'—the earth.
Asque'owan—arrow.
Assentucara—"it shineth."
Asse'ntamin—"a pear" (?).
Assimi'n—walnut (hickory?).
Assimoest—fox.
Attomoi's—dog.
Awshocuttis—"a bird with carnation-colored wings," with whose feathers the Indians adorned themselves.
Bocata'w—fire.
Caasun—village.
Cahangoc—goose.
Camatin'g—six.
Camzowa'n—rain.
Cantoca'n—dance.
Cawwin—sleep.
Chacasow—crack.
Cheawanta—"a robin red-breast."
Chechinkamin—chinkapin.
Chehip—bird.
Checomaw'—muscle shell.
Chingissum—warm weather.
Coan—snow.
Coaqus—gull.
Commoti'ns—turtle.
Coquain—calm.
Crenepo—woman.

Cunnaiu—long.
Cunse'nagwus—an Indian tomahawk.
Cuppatoan—sturgeon.
Cuppanauk—gate.
Cuttac—otter.
Cutteru'—"to grow high.'
Cuttoxeen—weary.
Damisac—knife.
Escowascus—sedge.
Hanguequi'ns—"a little stone pot."
Huspissa'wn—leap.
JAPASAWS—chief of the Potomacs.
Kecuttano'was—lightning.
Kenewu'—sharp.
Kequasson—"a pot to drink in."
Kittasco'ok—adder.
Macha'camac—"a great house."
Mache'ss—low.
Mahawk—gourd.
Manawngwas—butterfly.
Mangoit—great.
Manote—basket.
MAOCO—a man's name.
Maracaw—"apple."
Marakimmin—grape.
Marahungoc—young goose.
Mascohing—"parrot."
Matac'awiac—pearl.
Matassu'n—copper.
Mawngwipacus—leaves.
Mawsawn—nettle.
Mayis—"going in a path."
Mequanoc—a long feather.
Mettacook—a stalk.
Mettaquins—grass.
Metux—bridge.
Missanek—squirrel.
Moccasin ("mawhcasun")—shoe.
Mohocan—fish-hook.
Moincaming—dead leaves.
Momuscan—mole.
Monachoc—sword.
Monanaw—turkey.
Moroke—cedar.
Muscain—"glorious, smooth, or beautiful."
Mussetaquao—circle.
NACOCHTANK—the aboriginal settlement at the mouth of the Anacostia.
Nammas—fish.
Nawntam—wolf.
Nawpin—sit down.
Nepensun—dust.
Neppawngunnu—blood.
Nisake—a cane (plant?).
Nissacan—reed.
Nonattu—fawn.
Nowanus—lost.
Nusomon—below.
Nuttacawm—deep.
Nuttaquon—flea.
Ocquins—"a watchet-colored bird."
Octa'mocan—a cup or drinking vessel.
Ohawas—a crow.
Opain—white.
OPECHA'NCANO—the brother and successor of Powhatan.
Opommin—chestnut.
Opotena'oc—eagle.
Opunawk—groundnut.
Oronoca—a garden.
Ospanno—a turkey cock.
Ossantamin—a pea.
Papaso'—sunrise.
Pascamath—mulberry.
Pascorath—"the gold sparks in the sand" (mica).
Pawcu'nnao—dark.
Pawngun—a little.
Peccatoa's—bean.
Pemanataon—thread, cord.
Penninaw—robe.
Petawin—the ground.
Pisquaon—duck.
Pittao—froth.
POCAHONTAS—the daughter of Powhatan and friend of the whites.

Pocataws—wheat.
Pocohawk—pestle, awl.
Pocoons—a red dye.
Pocosac—gun.
Pomotaw—hill, mountain.
POWHATAN—the great chief of the confederated tribes of the lower Potomac region.
Porance—fire.
Porasap—a bag.
Pungo—ashes.
Quanacut—rainbow.
Quangatarask—owl.
Racaw—sand.
Rapanta—venison.
Rarrascaw—air.
Rarenaw'—a chain, wampum.
Rasanear—run.
Reconac—tobacco pouch.
Rickahone—comb.
Sacaho'ok—"the cleere stones we gather."
Sawwone—salt.
SECAWESA—a man's name.
Shacahocan—stone.
Succohanna—water.
Tacaho'ac—a mortar.
Tacquasu—short.
Tamaci'n—swim.
Tamuscamaw—flowing water.
Tanaowa'm—where do you live?
Tapaco—night.
Taquit'oc—autumn.
Tasa'ntaso—the whites.
Tashoac—all is out.
Tatamaho—garfish.
TAYAC—the great chief of southern Maryland. Probably a title rather than a name.
Tomahawk("tamahaac")—hatchet.
Towaw—strong.
Tuckaho—"In June, July, and August they feed upon rootes of tockohow."
Tussan—a seat.
Uppowo'c—tobacco.
Usawac—yellow.
Utaca'n—dish.
Utacaskis—lizard.
Uttacawai—panther.
Uttapawntam—deer.
Wawchesa'o—a nest.
Wecuttis—rabbit.
Weputtahoc—a stake.
Winganoose—very good.
WINGANUSK—the "great darling" of Powhatan.
Wingatu—ripe.
Wiroance—a chief.
Wisacanac—a rabbit skin.
Wohaicank—fish scales.
Woscan—a bone.
Wushagun—deer.
Wusicket—a brook.
Yeocanta—river.
Yohacan—house.

Respectfully submitted:

JAMES MOONEY, *Chairman of Committee.*
WM. H. BABCOCK. W. HALLETT PHILLIPS.
W. H. HOLMES. LESTER F. WARD.

The above report was read at a meeting of the Anthropological Society and discussed by Mr. W J McGee, Mr. Spofford, Librarian of Congress; District Commissioner Douglass, Mr. Edward Goodfellow, Mr. F. C. Somes, James Mooney, and others. Mr. Douglass expressed his warm approval of the suggestions and general recommendations embodied in the report. Mr. Spofford advocated the substitution of another alphabetic series in place of the present

letter names on the ground of liability of confusion between B and P, M and N, etc.

The most important suggestion was that of Mr. F. C. Somes, who proposed to call all principal city thoroughfares numbered streets, having those running in one direction to bear even numbers, while those running at right angles to them would be called after the odd numbers. This plan, which seems feasible, would obviate all possibility of confusion between streets and avenues of the same number, together with the necessity of using the term street or avenue in connection with the number in every case, and the only apparent objection is that it would necessitate a readjustment of the names of the present numbered streets.

There being no objection, the report was declared adopted.

THE NAVEL IN LOCAL NAMES.—The origin of the words for *navel* in the different languages of the world presents many curious facts. So we notice that in Germanic languages it is the diminutive of *nave* and *Nabe*, the center of a wheel or shield, the words navel and Nabel being the "small-sized center of the belly"—and in Latin *umbo* forms a diminutive *umbilicus*, the small boss or central eminence of any round body, and of the abdomen as well. In one of the earliest monuments of Greek poetry we see the corresponding word ὄμφαλος applied in describing an island of the sea, the isle of Ogygia, the home of the nymph Kalypso, who lived (Odyssey I, 50) "on an island surrounded by the oceanic floods, where the navel of the sea is" (*νήσῳ ἐν ἀμφιρύτῃ, ὅθι ὄμφαλος ἔστι θαλάσσης*). Many have been searching for the position of this (certainly *mythic*) island, which, as is stated in the passage, lay in the middle or center of the main, and when its elevation above the briny surface had to be pointed out, could with propriety be likened to a *knob* or *boss of the sea*. A commentator of Homer, Eustathius, who lived in the tenth century of our era, declared Ogygia to be the very center of the Atlantic and of the whole watery element. A round stone in the Delphian temple of Apollo was called *the navel* as marking the middle point of the earth (Pindar, *Pyth.* IV, 131; VI, 3), and by this term an altar in the city of Megara was also known. From the round stone in the Delphian temple the term *omphalos* passed over to the city of Delphi itself, for it became known at large as "the center of the inhabited world." Roman authors called it *umbilicus terrarum* and *umbilicus Græciæ* after their Greek authorities, who

also named the city of Enna, Sicily, with its numerous temples, "the navel of Sicily" (Cicero, *Verrin. orat.* II, 4, 48). The pin or index of a sun-dial was called by the same term, being the eminence in the central point. It has also passed into botany, for the *navelwort* or *Umbilicus Veneris* received its appellation from a projection in the middle of its flower. From its more modern botanical name, *Umbilicaria*, was formed, by phonetic changes, the name of *Umbilix* and *Malix*, a village on a mountain slope in the Grisons, Switzerland, where the weed in question was found to occur. The round knobs at the ends of booksticks were called by the Romans *umbilici* or *cornua*, horns.

In gathering local names derived from the *navel* I have not been very successful, but will present what I have on hand, beginning with *Mount Tabor*, in Palestine, the name of which also appears as *Atabyrion* in another Semitic country and dialect, and is said to mean *navel*. America presents the following:

The artificial navel-shaped mound, from which the Cha'hta people ascended to the surface of the earth, as alleged, lies in Winston county, Mississippi, and was a sacred place in early periods. They called it the "navel of the country;" it showed the spot where the abdomen of a giant, the world's creator, lay below, and upon his command they climbed up there from the nether world.

Opposite the Indian pueblo of Zuñi, on the south bank of the Zuñi river, lies the ruin *Hálona*, one of the "Seven Cities of Cibola," and called by the early Spanish explorers *Alona*. It once occupied both banks of the river and some of the walls of ancient Hálona comprise to-day a portion of the southwestern section of the Zuñi pueblo. The full Zuñi name is *Hálona itiwana*, which we may with equal correctness interpret: "the middle place of happy fortune," or "the middle anthill of the world," or "the anthill at the navel of the Earth Mother." (Cushing in "The Millstone," vol. IX, 55, Indianapolis, 1884; *idem*, in Compte Rendu Cong. Int. Amér., VII, 190, Berlin: 1890; Corresp. of F. Webb Hodge; cf. his review of Fewkes' Journal in ANTHROPOLOGIST, July, 1891.)

Cuzco, the ancient capital of Perú during the two centuries of the Inca dynasty, is said to be built in a local depression rising up in ringlike shape like a navel. Kosco meant *navel* in the "language of the Inca," according to Garcilaso de la Vega, but in the actual language of the Peru Indians, the Runa simi, is no longer used in that acceptation (Middendorf, Keshua Wörterbuch).

A. S. GATSCHET.

NOTES ON THE CHINOOK LANGUAGE.

BY FRANZ BOAS.

The Chinook language was spoken along the banks of Columbia River from the Cascades down to the Pacific Ocean. Since Horatio Hale published his great work on the philological results of the Wilkes Expedition, in which he made us acquainted with the languages of the North Pacific coast of America, no further material on the grammar of the Chinook has been published.

Two principal dialects of this language may be distinguished—the Upper Chinook, spoken from the Cascades to Grey's Bay on the northern bank and to a point a little above Astoria on the southern bank of the river, and the Lower Chinook, spoken on Shoalwater Bay, at the mouth of Columbia River and a little to the south of its southern entrance. The Upper Chinook is subdivided into a number of dialects, which differ to some extent, while the Lower Chinook had only two dialects—the Clatsop, which was spoken on Clatsop peninsula, and the Chinook proper, which was spoken on Shoalwater Bay. The difference between these latter dialects is very slight.

In the following lines it is intended to give a brief sketch of this language, based mainly on a series of texts collected by the author on Shoalwater Bay in 1890 and 1891. The remarks refer to the Chinook dialect, but occasional references to the Katlamat dialect of the Upper Chinook are given.

The following characters are used to render the sounds of the Chinook language:

a, e, i, o, u, have their continental sounds (short).
ā, ē, ī, ō, ū, long vowels.
ᴇ the obscure *e* in *flower*.
ᵃ, ᵉ, ᶦ, ᵒ, ᵘ, vowels not articulated, but indicated by the position of the mouth.
ä as in German *Bär*.
â as *aw* in *law*.
ô as *o* in German *voll*.
- separates vowels which do not form diphthongs.

ai	as *i* in *island*.
au	as *ow* in *how*.
l	as in English.
ll	very long, slightly palatized by allowing a greater part of the back of the tongue to touch the palate.
ɭ	posterior palatal *l*. The tip of the tongue touches the alveoli of the lower jaw, the back of the tongue is pressed against the hard palate, sonans.
ʟ	the same, short, surd (Lepsius's t̠).
ʟ̲	the same, with very great stress of explosion.
q	velar k.
ɋ	velar g.
k	as in English.
k·	palatized *k* (Lepsius's *k'*), almost *ky*.
k*x*	might be better expressed as a posterior palatal *k*, between *k* and *k·*.
x	same as *ch* in German *Bach*.
x	*x* pronounced at the posterior border of the hard palate, with *â* position of mouth.
x·	palatal *ch*, as in German *ich*.
s, c,	are evidently the same sound and might be written *s·* or *c·*, both being palatized. *c* (English *sh*) is pronounced with open teeth, the tongue almost touching the palate immediately behind the alveoli. *s* is modified in the same manner.
d, t, b, p, g, k,	as in English; but surd and sonant are difficult to distinguish.
h	as in English.
y	as in *year*.
w	as in English.
m	is pronounced with semi-closure of the nose and with very light compression of the lips. It partakes, therefore, of the character of *b* and *w*.
n	is pronounced with semi-closure of the nose. It partakes, therefore, of the character of *d*.
¡	designates very great stress of the articulation of consonants.
!	designates very great stress of the articulation of consonants due to the elision of *q*.
ʕ	is a very deep laryngal articulation due to the elision of *q*.
'	a pause.

It will be seen from this list of sounds that the phonetic system of the Chinook resembles closely that of the languages spoken farther north on the coasts of Washington and British Columbia. We find an abundance of guttural sounds and palatized l's, frequent pauses,

many consonants pronounced with increased stress, and great variability of the vowels.

Variations of the vowel of the theme of nouns and verbs are due to various causes, namely, to emphasis, to diæresis expressing a plural or distributive, or to the endeavor to effect harmony between the vowel of the prefix and of the stem. *tell*, tired, when emphasized becomes *täll*: *nikct*, not, goes through all stages from *nekct* to *näkct*; *alxel'ōkō*, he awakes; *alxel'ō'yōkō*, they awake (theme *-'ōkō*) shows the occurrence of diæresis conveying a distributive or plural meaning; *ē'k·ala imō'lak*, a male elk (theme *-k·ala*); *ō'k·ōla ō'penpen*, a male skunk, shows the variation of the vowel of the theme, which takes place in order to bring about harmony between the vowel of the prefix (*ē-* masculine article, *ō-* feminine article) and that of the theme.

The language abounds in abstract terms. It is particularly remarkable that many concepts which we use in the form of adjectives occur as abstract nouns only. For instance, it is impossible to say "a bad man," but this is expressed by "the man, his badness." The Chinook does not say "I am sick," but "my sickness is on me;" he does not say "I shoot him," but "the action of shooting him I perform it against him." Abstract concepts of this character are very numerous.

There exist a surprisingly large number of onomatopoetic terms. Almost all names of birds may be considered such. A long series of verbs expressing actions accompanied by a noise or only more or less closely related to such noises are undoubtedly of onomatopoetic origin. These terms are not subject to inflection; they are repeated in order to express a frequent or repeated occurrence of the action. *lex*, to tear; *q!ut*, to tear off; *ts!ex*, to split; *lxoa'p*, to dig; *temm*, noise of walking; *k·!emm*, no noise; *hē'hē*, to laugh, are examples of words of this class.

The language has three well-defined genders. The genders are masculine, feminine, and neuter, the latter originally designating small objects. The gender is denoted by a prefixed article which is inseparably connected with the noun. In the dual and plural forms there is no distinction between these genders. We find the following articles:

Singular:	Masculine, *ē-* or *ī-*.	Dual, *c-*.
	Feminine, *ō-* or *ū-*.	Plural, *t-*.
	Neuter, l-.	Indefinite, l-.

Examples:

Masculine:	*ē'k·ala*, man.	*ēqtq*, head.
	igō'ma, bird arrow.	*ēlɛmē'tk*, bed.
	ikanī'm, canoe.	*ē'qēl*, creek.
Feminine:	*ō^{s}ō'kuil*, woman.	*ō^{s}ō'lax*, sun.
	ō'kumatk, baton.	*ōgō'wē*, raspberry.
	ō'kulaitan, arrow.	*unā'lala*, rattle of deer hoofs.
Neuter:	*lk¡āsks*, child.	*l^{s}ā'pla*, roe.
	l^{s}ɛ'ltcam, horn.	*lā'semilqs*, nose ornament.
	lɬcuq, water.	*lgōlē'lɛɛmk*, person.
Indefinite:	*lk·a'la*, a man.	*l^{s}ā'kil*, a woman.

Sometimes the masculine and feminine articles are used to distinguish large and small objects:

ē'pqunx, large basket.	*ō'pqunx*, small basket.
ē'pɛnpɛn, badger.	*ō'pɛnpɛn*, skunk.

The plural has generally the article *t-*, but often also l-. In numerous cases the article remains the same in singular and plural. Sometimes the plural has the feminine article, while the singular is masculine.

Plurals with the article *t-*: *ēqoa-inē'nē*, beaver; pl., *tqoa-inē'nē*.
lɛ'cgan, plank; pl., *tɛc'gan*.
igitē'tcxala, piece of meat; pl., *tgitē'tcxala*.
Plurals with the article l-: *ō'kumatk*, baton; pl., *lkumatk*.
ō'p⌊ikē, bow; pl., *lp⌊ikē*.
Plural with the feminine article: *ikanī'm*, canoe; pl., *ōkunī'm*.

Suffixes denoting the plural are quite frequent. The most important is *-ukc* or *-ikc*. This suffix denoted originally a plurality of human beings. When used with numerals and indefinite pronouns it always designates human beings:

ka'nauwē, all; *lkanauwē'tikc*, all people.
iq¡ēyō'qxul, old man; *lq¡ēyō'qxtikc*, old people.
ē^{s}ō'k, blanket; *t!ō'kkc*, blankets.

-ma originally distributive (*-max* in Katlamat):
ō^{s}ō'lax, day; pl., *t!alā'ma*.
ē'mal, bay; pl., *lmā'lɛma*.

-nana perhaps only with words designating relationship:

ōgu'lak, my aunt; *lge'lakɛnana*, my aunts.

Sometimes very remarkable, although regular, forms originate through the elision of *q*. For instance, *ē'qēɬ*, creek; pl., *t!ā'ɬɛma*. The theme is *-qēɬ*. The *q* is elided, and owing to this fact the *t* is strengthened. The *ē* is transformed into *ā* on account of the article *t-*. *-ma* is the plural suffix mentioned before.

Irregular plurals are not very frequent:

ɬk!āsks, boy; pl., *tqā'sōsinikc.*
ō^{s}ōkuil, woman; pl., *tā'nɛmckc.*

Certain words occur only as *plurale tantum;* they are collective terms:

t!ōɬ, house; pl., *t!ōɬē'ma* (theme, *-quɬē*).
txut, smoke.
nauā'itk, net; pl., *nauā'itgɛma.*

The dual has the article *c-*. It has, as a rule, no suffix:

iq!ēyō'qxut, old man; dual, *cq!ēyō'qxut.*
ɬk!āckc, child; dual, *ck!āckc.*

Some words are *duale tantum.* In many cases the reason is obvious, while in others it remains obscure:

ckulkulō'ɬ, double-headed harpoon.
cɛqxō, double-pointed arrow.
c'ē'ɬxatcɨ, rain.
ckɛnī'm, toy canoe.

There are no cases. The possessive relation is always expressed by means of the possessive form. All local relations are expressed by means of the preposition *gō* (in Katlamat by the postposition *pa*). The indirect object and the instrumentalis are not expressed by a separate preposition or by a form of the noun, but by incorporation in the verb (see below).

As the possessive form is closely connected with the personal pronoun, I give the latter first:

I, *nai'ka.*	we two, inclusive, *ɬxai'ka.*	we, inclusive, *lxai'ka.*
thou, *mai'ka.*	we two, exclusive, *ntai'ka.*	we, exclusive, *ntcai'ka.*
he, *ia'xka.*	you two, *mtai'ka.*	you, *mcai'ka.*
she, *āxka.*	they two, *cta'xka.*	they, ɬā'*xka.*
it, ɬā'*xka.*		

These independent forms of the pronoun are compounds of *n-*, *m-*, etc., which are the pronominal stems.

The possessive form is derived from these stems, a few forms excepted. The possessive pronoun stands between the article and the noun. It has separate forms for the various articles:

MASCULINE.	FEMININE.	NEUTER.
Chief.	Chieftainess.	Dog.
my, *itci'xak/Emana.*	*ōgu'xak/Emana.*	*LgE'xẽwucx.*
they, *imẽ'xak/Emana.*	*ōmẽ'xak/Emana.*	*Lmẽ'xẽwucx.*
his, *iã'xak/Emana.*	*ōyã'xak/Emana.*	*Liã'xẽwucx.*
her, *itcã'xak/Emana.*	*ōgõ'xak/Emana.*	*Lgã'xẽwucx.*
its, *iLã'xak/Emana.*	*ōLã'xak/Emana.*	*Lgã'xẽwucx.*
our two selves, incl., *itxa'xak/Emana.*	*ōtxã'xak/Emana.*	*Ltxã'xẽwucx.*
our two selves, excl., *intã'xak/Emana.*	*ōntã'xak/Emana.*	etc.
your two selves, *imtã'xak/Emana.*	*ōmtã'xak/Emana.*	
their two selves, *ictã'xak/Emana.*	*ōctã'xak/Emana.*	

The dual and plural have the same forms which are found in the neuter. It appears from this paradigm that the only forms which are not derived from the personal pronoun are the first person singular and the third person feminine singular.

Adjectives have always the gender of the noun which they accompany. They have also always the article, but the feminine is here *a-* instead of *ō-*, as it is in the pronoun.

many: masc., *ẽ'xau-it;* fem., *ã'xau-it;* neut., *LE'xau-it;* pl., *ō'xu-it.*

It was mentioned before that most of our adjectives are expressed by means of abstract nouns; p. e.:

a pitiful man, *ẽ'k·ala Liã'xauyam* = the man his pity.
a bad woman, *ō°ō'kuil itcã'q/atxala* = the woman her badness.

Among the numerals only "one" has the article and consequently gender. It has also a separate form for human beings:

	All objects except human beings.	Human beings.
1.	m., *ẽxt;* f., *aẽxt;* n., *Lẽxt;* d., *ctẽxt;* pl., *tẽxt.*	m., *ẽxat;* f., *aẽ'xat,* etc.
2.	*mõkct.*	*amõ'kctikc.*
3.	*Lõn.*	*Lõ'nikc.*
4.	*lakt.*	*Lla'ktikc.*

Numeral adverbs as well as other adverbs are formed by the suffix *-ẽ: mõ'kctẽ,* twice; *mã'Lnẽ,* seaward.

The verb is incorporating to a degree. The subject, the direct and the indirect objects, are all expressed in it. We may distin-

guish between intransitive, medial, and transitive verbs. The first class are formed mainly by prefixing the pronoun:

nōc, I am there. *iōc*, he is there.
mōc, you are there. *ōc*, she is there.
ʟ*ōc*, it is there.

The same class embraces the numerous verbs which consist of an adjective or noun or an unchangeable (mostly onomatopoetic) term and an auxiliary verb. I give here the historical present of such a verb:

ʟ*ōx anᴇ′xax*, I fall; ʟ*ōx atxᴇ′xax*, we two (inclusive) fall; ʟ*ōx antᴇxax*, we two (exclusive) fall; ʟ*ōx alxᴇ′xax*, we (inclusive) fall; ʟ*ōx antcᴋ′xax*, we (exclusive) fall.

ʟ*ōx amᴋ′xax*, thou fallest; ʟ*ōx amtᴇ′xax*, you two fall; ʟ*ōx amcᴇ′xax*, you fall.

ʟ*ōx nē′xax*, he falls; ʟ*ōx nā′xax*, she falls; ʟ*ōx a*ʟᴇ′*xax*, it falls; ʟ*ōx acᴇ′xax*, they two fall; ʟ*ōx nō′xox*, they fall, etc.

The perfect is:

nkēx, I have been; *mkēx*, thou hast been; *ikē′x*, he has been.
akē′x, she has been; ʟ*kēx*, it has been, etc.

Transitive verbs always incorporate the object. When subject and object, and I may add here, indirect object, are nouns, the pronouns of the third person having the corresponding genders and numbers are incorporated. If the objects are pronouns, they are as well incorporated. Subject and object are prefixed, the former preceding the latter. While in most cases the pronouns can be readily recognized in these prefixes, there are a number of exceptions. The prefix of the third person singular masculine and feminine subject differs from the pronoun as found in the intransitive verb. Furthermore, in the combination: subject first person, object second person, certain modifications are found. I select a few examples in order to illustrate the formation of these forms·

*-uk*ʟ, to carry.

I carry thee, *ayā′mukʟ*. I carry you two, *ayā′mtukʟ*. I carry you, *ayā′mcukʟ*. I carry him, *anā′yukʟ*. I carry her, *ā′nukl*. I carry it, *ānᴇ′ʟukʟ*. I carry them two, *anᴇ′ctukʟ*. I carry them, *anᴇ′tukʟ*. We two, inclusive, carry him, *atxgā′yukʟ*. We, inclusive, carry him,

alxgā'yukɪ. We two, exclusive, carry him, *antgā'yukɪ*. We, exclusive, carry him, *antcgā'yukɪ*.

Thou carriest him, *amā'yukɪ*. You two carry him, *amtgā'yukɪ*. You carry him, *amcgā'yukɪ*.

He carries him, *atcā'yukɪ*. She carries him, *agā'yukɪ*. It carries him, *aɪgā'yukɪ*. They two carry him, *acgā'yukɪ*. They carry him, *atgā'yukɪ*, Somebody carries him, *aqā'yukɪ*.

The last form serves as a passive. A real passive is not found.

Whenever an indirect object accompanies the verb the pronoun of the indirect object followed by an *l*, which designates the indirect object, is also prefixed to the verb. It follows the pronominal suffix designating the direct object:

-ōt, to give (probably *-ō-* verbal prefix, and *-t* direction toward).
atcilxā'lōt, he gave it (masc. objective) to us; *a-*, historical present; *tci-*, he, *-i-*, masc. object.; *-lx-*, us; *-a*, probably euphonic; *-l-*, designating indirect object.
atcɛmanā'lot, he gave thee to me.

The indirect relation of intransitive verbs is expressed in the same manner:

ē'tcitc!a ayanā'lax, I am sick = my sickness is on me.

Medial verbs are such verbs as may be transitive, but appear without an object. They are formed by the reflexive prefix *-x* or *-xɛl*, which follows the subject prefix and precedes the verb.

na-ixɛ'lqam, he shouts. *atcigɛ'lqam*, he calls him to himself.
agiō'la, she shakes him. *nē'xɛla*, he shakes.

The verb has not very many tenses. The most important are:

a- (prefix), the historical present; *ayā'mukɪ*, I carry thee.
-a (suffix), future; *yamō'kɪa*, I shall carry thee.
a—x, present, expressing often repeated actions; *ayā'mukɪx*, I used to carry thee.

There are practically no moods. The imperative of the intransitive verb is identical with the future, while in the imperative of the transitive verb the subject prefix is omitted: *ē'kɪa*, carry him. The interrogative is formed by the suffix *-na* (*-tcē* in Katlamat), which is appended to the one mood of the verb.

All the numerous forms which we find in most Indian languages expressed by derivatives, and which we express by auxiliary verbs, are here expressed by adverbs, which are followed by the verb in its declarative mood:

qā'doxuĕ, must.	*qē'xtcē*, will.
ai'aq, can.	*qxā'oxaʟ*, cannot.

There are but few derivatives. I found the following:

Frequentative	*-a-itx.*	*aʟx'ō'tōʟ*, he bathes.	*aʟx'ō'tōʟa-itx*, he bathes often.
"	*-l.*	*agiō'la*, she shakes him.	*agiō'lal*, she shakes him often.
Causative	*-ta-mit.*	*aʟō'ʟa-itx*, he stands.	*aqʟōʟā'ētamitx*, somebody places him upright.

Word composition is not carried on to the same extent as among the neighboring languages. The language lacks altogether the faculty of incorporating nouns in verbs, which is so remarkable a feature of the Salishan, Wakashan, and Chimakuan languages. Local affixes are, however, quite numerous and of frequent occurrence:

-p!, into (*-pq* in Katlamat); *ā'yōp!*, he entered.
-pa, out of; *ayō'pa*, he went out.
-ptck, from sea landward, from the middle toward walls of house; *ā'yōptck*, he went up from sea to land.
-ʟx, from land seaward, from sides of house toward middle; *ā'yōʟx*, he went down to the beach.
-wilxt, upward; *ayō'wilxt*, he went up.
-itcō, downward; *ayō'itcō*, he went down.
-t-, towards speaker; *ayō'tkʟam*, he brought it here.
-k-, on top of; *ʟōkōc*, it is on top of.
-x-, on ground; *ē'xōc*, he is on ground.

It is worth remarking that reduplication is entirely absent from the language. The unchangeable words (mostly onomatopoetic terms) are duplicated (see above) in order to express a distributive—*i. e.*, to express that the action expressed by them refers to a plurality of objects:

kjau'kjau atci'tax, he tied them.

RISING AND FALLING OF THE SKY IN SIOUAN MYTHOLOGY.—On page 344 of the AMERICAN ANTHROPOLOGIST for October, 1892, appeared an article on the "Rising and falling of the sky in Iroquois legends." The present writer calls attention to the Omaha myth of "The Chief's Son and the Thunders," published in Contributions to North American Ethnology, vol. 6, "The Dhegiha Language, Myths, Stories, and Letters," pp. 185–188. In that myth it is said that the chief's son and his followers came at length to the end of the sky, which was perpendicular and, after descending quickly into a chasm in the earth, ascended as quickly to its former place. Thus it acted continually; therefore, in order to pass across the chasm in safety, one must watch his chance. The chief's son and all his followers but the last one crossed the chasm, but the warrior at the end of the line hesitated too long and was carried down into the chasm; but on the return of the party the followers were sent over the chasm in advance of the leader, who, as he sprang over, extended one arm down into the chasm and drew up the dead man, whom he thus restored to life.

J. OWEN DORSEY.

AMERICAN FOLK-LORE SOCIETY.—At the annual meeting of this Society, held in Boston, December 28th and 29th, the following papers were read:

Abby L. Alger. Survival of Fire-sacrifice among Indians in Maine.
Fanny D. Bergen. Animal and Plant Weather Proverbs.
Franz Boas. Doctrine of Souls among the Chinook.
H. Carrington Bolton. A Modern Oracle and its Prototypes.
A. F. Chamberlain. Christ in Folk-lore.
J. Owen Dorsey. Two Biloxi Tales.
Adolf Gerber. The Relation of the Tales of Uncle Remus to the Animal Stories of other countries.
George Bird Grinnell. Algonquian Blackfoot Creation Myths.
J. C. Hamilton. The Algic Manabozho.
H. R. Kidder. Chippewa Tale of the End of Hiawatha.
George F. Kunz. Folk-lore of Precious Stones.
Henry R. Lang. Folk-lore of the Azorian Colonies.
John Maclean. Blackfoot Mythology.
Henry Mott. Medicine Men.
W. W. Newell. Examples of Forgery in Folk-lore.
D. P. Penhallow. Customs and Traditions of the Ainos of Japan.
Archibald R. Tisdale. Tales of the Abnakis.

PRIMITIVE DISTILLATION AMONG THE TARASCOES.

BY JOHN G. BOURKE.

During the month of September, 1891, it was my good fortune to be able to visit the romantically beautiful and fertile region of Lake Patzcuaro, in western Mexico.

It may be of interest to know that Lake Patzcuaro is the highest body of water in the world navigated by steamboat; that it is 45 miles long, 16 miles wide at its widest point, and 360 feet deep, with water crystalline and cold, and with scenery strongly recalling that of Lake Luzerne, in Switzerland. On its banks is situated the good-sized city of Patzcuaro—old, well built, and quaint—whose gentlemen still cling to the long, graceful Spanish cloak, the legitimate child of the Roman toga, and whose "young bloods" cavort about on spirited ponies, wearing suspended from their waists elegant silver-handled swords, probably one of the very last instances, at least on our own continent, of an adherence to this obsolete proof of gentility.

My purpose in going down there was to visit the famous coffee district of Uruapan and to examine the ruins of the college established by the Franciscans in 1581 for the education of the young men of the Tarasco race.

To get to these ruins, which are on the island of Tzintzontzin, it was necessary to hire a *chaloupa* or skiff, paddled by six stout Tarascoes. It was quite early in the morning when the water sprinkled from our paddles, and the Hotel Ybarra—the pompously titled inn wherein I had rested over night—faded from view astern. Our craft looked somewhat like a second-hand, unpainted Venetian gondola, with an absurdly high prow, upon which was perched the bow sculler or oarsman. The crew were jolly and good-natured, and two or three of them were able to speak Spanish with fluency. Many questions were plied by the natives as to the object of my going upon the lake and what business had brought me so far from my own country; but all these I answered gladly, intent on making up for it all in time. My note book was kept in hand all the while and soon began to give good evidence of the

patience and generosity of the Tarascoes, in turn, in responding to my interrogatories.

It was a very interesting boat ride and one productive of most startling information. The *patron* or captain of the *chaloupa* assured me—and all the crew confirmed his statement—that there was once a whirlpool in the middle of the lake, into which their ancestors in the olden time were accustomed to throw one or more babies every year. An earthquake or some other convulsion of nature some years ago had closed up this outlet (for such it would seem to have been), and ever since then the waters had been gradually deepening until they had now encroached upon fences, sheds, houses, and fields formerly high above their reach.

We passed by the rocky islet of San Piedrecito, to which priests still go on certain occasions to bless the waters of old Patzcuaro and the labors of the dark-skinned fishermen who sit stolidly and reverently in their home-made wooden *chaloupas* at its foot.

When I suggested that before the coming of the *padres* the medicine-men of the tribe must have occupied that isle of the fisherman the *patron* responded urbanely: "Yes, that is true; but in those times, you know, our grandfathers used to throw little babies into the water and eat human flesh."

We made side excursions to many points to see the fishermen setting their nets or making hauls of the silvery sardine-shaped *charraras*, so highly prized by the epicures of the city of Mexico, and to watch the women and children on the bank industriously plaiting *petates* of tule or corn leaves, making baskets, or baking pottery beautiful in contour, fine in grain, and rich ruby-red in color.

Many *chaloupas* passed us, hurrying to Patzcuaro to sell or to buy. The whole scene was interesting, animated, and varied. Soon a thin line of smoke was seen issuing from the foliage on the crest of a knoll, and each Tarasco looked anxiously at me as the *patron* said: "They are making mescal over there. Would you not like us to row over? It is not very far." I replied that I would, but intimated that they must show me all about the mescal-making and keep their promise to guide me to Tzintzontzin. No sooner agreed than the prow of the *chaloupa* was ploughing its way to the primitive alembic.

I may omit any references to the kind treatment received from all the family on the island of Tzintzontzin—as this proved itself to be—and need not describe the shrine of the Madonna, in front of

which, in an earthenware brazier, was burning a small piece of *copal*, a favorite offering made by the Aztec tribes to their gods.

The still was erected at the edge of a vertical bank of hard clay, a situation which simplified labor very much. The whole apparatus was of the most primitive kind, but the product was exceptionally good and clear.

A Tarasco still.

At *a* was the fire, with outlet for smoke at *b*; *c* and *d* were hoops, against which were placed the staves, secured on the outside by other hoops or circles apparently of willow. At *e* was the mashed mescal in a large earthen bowl; *f*, on top of the still, was another large bowl full of cold water, which was ladled out by an attendant as it became heated and supplied afresh. The steam arising from the heated mescal condensed against the bottom of the bowl (*f*) filled with cold water and then dropped into a bowl (*g*) placed at

at angle. This bowl was called the *cuchara* or spoon. From the *cuchara* the mescal ran out through the tube *k*, made of mescal stalk, into the *olla* or water jar *l*. On one of the staves, at *h*, was a rudely incised crucifixion, marked there, as I was told, to ensure *buena suerte* ("good luck").

The entire process of preparing the mescal for distillation was in operation at the time and was explained in detail. Only the center of the plant, resembling a cabbage head and called the heart, was used, the exterior leaves being rejected, although they are rich in saccharine matter and are used as food by the Apache and Navajo Indians.

These hearts were first baked in "mescal pits" lined with heated stones and covered with wet grass and earth. Upon being transferred to shallow basins made in the ground and lined with flat rocks they were mashed into a coarse pulp with heavy wooden mallets, then exposed to the sun to insure fermentation. It was this fermented mass which I saw placed in the kettle of the still (at *e*).

In this description, bald as it is, I desire to call attention to what seems to me a very curious point. There was nothing used which was not strictly aboriginal; the crucifixion need not be excepted, as the sign of the cross has been a religious emblem of the American tribes and observed as such from Gaspe to Yucatan.

The wooden barrel was very rude in construction, the gaping seams being closed with wet clay and gum. The Tarascoes, from time immemorial, have been celebrated workers in wood and have felled and cut large pine trees of which they have built their *chaloupas* 25 or 30 feet long. They also make all the wooden spoons, ladles, and other kitchen ware used in that part of the country.

I am far from committing myself to the proposition that the Mexican Indians were acquainted with distillation before the time of the conquest. Indeed, when and where distillation was first practiced will perhaps never be known. The Chinese claim the discovery for one of their kings who lived 2600 B. C. I do not recall any reference to the distillation of liquors in the works of Sahagun, Motolina, or other early clerical writers on the manners and customs of the Aztecs. The omission, however, is not of great significance. Those writers have preserved for science much valuable ethnological material, but they observed and wrote from the standpoint of the missionary and not from that of the anthropologist. The word

vino (wine) occurs with some frequency in their treatises, but it has generally, and I think correctly, been regarded as referring to the fermented beverage *pulque*.

Mescal is distilled in all parts of Mexico, in the rudest hamlets, in the most secluded mountains, but always in the manner above described. A finer liquor called *tequila* is made by distilling the fermented sap of the maguey.

It would be natural to assume that among the first things the natives learned from the Spaniards after the conquest of Mexico was the manufacture of intoxicants. The Mexican peon has a natural taste and skill in such preparations, and uses not only the mescal and the maguey, but the Spanish bayonet and the yucca as well. He also makes from the *tuna* or Indian fig (the fruit of the *nopal* cactus), a kind of hard cider, called *colonche*, which is quite intoxicating.

I repeat that the failure of the Spanish writers to mention certain things is no great argument against their existence, and I cannot make this more clear than by saying that they have all ignored the employment by the aborigines of the trident and throwing-stick, which I found in daily use among the Tarascoes of Lake Patzcuaro. Prof. Otis T. Mason informs me that the specimen of the latter which I was fortunate enough to procure is identical with the *atlatl* which figures in the codices or Aztec picture-writings.

THE ANCIENT GRAVES OF THE VAZIMBA, the aboriginal inhabitants of the interior of Madagascar, are found scattered over the central province. These are shapeless heaps of stone, generally overshadowed by a *Fàno* tree, a species of acacia, which has a semi-sacred character, its seeds being used in divination. Could these graves, like the ancient English barrows, be opened, doubtless much light would be thrown on the rather difficult question of the affinities of these Vazimba; but to meddle with any tomb, much more one of these ancient ones, is one of the most heinous offences among the Malagasy. A considerable number of upright stones, termed *Vàtolàhy* (lit. "male stones"), huge undressed blocks of granite, are also found on the hills and downs. These are memorials of former chieftains or of battles of the old times.—Sibree in *Proc. Royal Geog. Soc.*, p. 746, Nov., 1892.

MAKANGA CUSTOMS.—Mr. D. J. Rankin, in the November number of the *Scottish Geographic Magazine*, speaks of his arrival on the Revugwe at Kamsiki, in the Loangwa-Zambesi basin, Africa, as an occasion of great public rejoicing and festivity by the natives. "Several miles from the town I was met and escorted in by the chief's state band, consisting of flutes, drums, and native musical instruments, my near approach to the kraal being heralded by an incessant firing of muskets, tootling of flutes, banging of drums, and deafening shouts and cries from a crowd of two or three thousand people. Being led into the stockade by the chief, we were regaled in the courtyard by a number of amusements, lasting for several hours, which included conjuring, dancing, singing, and feats by strong men—the latter being similar to the feats performed in our own country fairs. In one of them a heavy wooden mortar used for pounding corn and rice, weighing about one hundred pounds, is placed on the stomach of a man, who is supported on two stools, and any one in the audience is invited to pound the rice or flour put in the mortar. A small wooden figure of a man is carefully placed on a mat by the performers, this figure being a kind of fetich to protect them from injury during their dangerous performance. These people come from the hill tribes, and their fetich created a great deal of amusement and ridicule amongst the higher-class Makanga sitting round."

WOMEN OF THE TROBRIAND ISLANDS.—The quarters of the principal chief of the Trobriand islands, British New Guinea, include seventeen houses, each occupied by a separate wife. At a little distance is the humbler establishment of the second chief, with the more modest allowance of five wives. Many of these ladies were old and far from prepossessing, but it seems that either from innate courtesy or some more prudential reason the Papuan always treats his older wives with more consideration than the younger. The people are all clothed, the women in fact possessing two petticoats, the one undyed, the second, used for dancing and other formal occasions, dyed and worn over the other; and they made a point of never coming into the governor's presence without this.—Trotter in *Proc. Roy. Geog. Soc.*, p. 791, Nov., 1892.

THE RURAL SCHOOL PROBLEM.

BY JAMES H. BLODGETT.

The changing relations between city and country, or urban and rural, population in the last fifty years have attracted general attention in Europe and America. Something like a law may be recognized in the experience of the United States, where the farming land is not yet all in the hands of individual owners. Omitting special influences like mining and timber-cutting, liable to be temporary, and some others liable to be more permanent, in limited districts, like fruit-raising and market gardening or the location of railroad stations, there is likely to be an increase in population of a newly settled agricultural town or county till owners occupy the land, by which time the population is likely to be at a maximum; then begins a decline. Immigration ceases, the children of the earlier settlers growing up leave home to try their fortunes on newer lands or in denser communities, and a little later those prosperously growing old in farm-work betake themselves to villages and towns for a more leisurely life. This might be illustrated all the way from Maine and from the Carolinas to the foot of the Rocky Mountains.

The city overwhelms us by aggregation of force and massiveness of concentration; but there is most hope for the physical life of a new-born babe in rural surroundings, not in the stifling pressure of lofty buildings that allows none but the wealthy to own homes. The best promise for a wholesome future to youth is in communities sufficiently compact to afford ready use of the modern post-office, railroad, and telegraph, and to furnish inspiring numbers for mutual effort without losing the beneficent influences of the farm, or at least of the garden and the orchard.

The family plans for preserving food from a superabundant harvest for a time of need, the selection and reservation of seed, the planting and cultivation, the care of animals, are part of the influences teaching the child and molding his character with a deeper power than any formal lessons. No school-room exercises with children accustomed only to brick walls and paved streets can do for them in certain important elements of character and knowledge

what is done for the country child by his surrounding conditions, even with the drawbacks of unrest and discontent with which so many endure rural life.

Opposite social conditions influence the organization and duration of schools in city and country. In the city one motive to lengthen the duration of school attendance is to provide a place of responsible supervision for children who cannot be kept busy under the eyes of their parents. In the open country the children can aid in raising or harvesting products under parental supervision. The city, either directly or by the power of credit, commands greater pecuniary resources than sparsely settled districts, and at any time of the year it can furnish the numbers necessary to organize schools. The rural occupations urgently press in special portions of the year, emphasizing the poverty of numbers which often makes it difficult to maintain a school. The conditions vary as we go from State to State, and as we go from county to county of the same State.

The report of the board of education of Massachusetts for 1890 gives three tests of the relative educational work of its fourteen counties, and the State census of 1885 shows the apparent rank in freedom from crime:

MASSACHUSETTS.

Rank of Counties in Public Education, 1890; in Freedom from Crime, 1885.

	1. Amount appropriated per child between 5 and 15 years of age.	2. Per cent. of taxable property appropriated.	3. Ratio of average attendance to number between 5 and 15 years of age.	4. Combined average of 1, 2, 3.	5. Rank in freedom from crime, 1885.
1	Suffolk.....	Berkshire...	Barnstable..	Barnstable..	Dukes.
2	Norfolk	Franklin ...	Franklin ...	Middlesex ..	Nantucket.
3	Middlesex ..	Barnstable..	Plymouth ..	Plymouth ..	Barnstable.
4	Barnstable..	Hampshire .	Dukes.....	Franklin ...	Hampshire.
5	Plymouth ..	Worcester ..	Norfolk	Norfolk	Franklin.
6	Bristol.....	Middlesex ..	Middlesex ..	Suffolk.....	Worcester.
7	Essex	Plymouth ..	Hampshire .	Hampshire .	Norfolk.
8	Hampden...	Bristol	Suffolk.....	Berkshire...	Hampden.
9	Worcester ..	Hampden ..	Essex	Worcester ..	Bristol.
10	Dukes.....	Essex	Berkshire...	Bristol	Berkshire.
11	Hampshire .	Norfolk	Worcester ..	Essex	Essex.
12	Franklin ...	Suffolk.....	Bristol	Dukes.....	Middlesex.
13	Berkshire...	Dukes.....	Hampden ..	Hampden ..	Suffolk,
14	Nantucket..	Nantucket..	Nantucket..	Nantucket..	Plymouth.

By *amount of money appropriated per child between 5 and 15 years of age*, Suffolk county stands first, Berkshire thirteenth.

By *per cent. of taxable property* thus appropriated, Berkshire is first and Suffolk is twelfth.

By *ratio of average attendance to the school census*, Barnstable, which was fourth by the first test and third by the second, becomes first; Suffolk is eighth and Berkshire tenth. By combining all the tests, Barnstable leads the State.

Massachusetts is so uniformly earnest in popular education that the extremely dissimilar tangible results in her towns and counties are especially suggestive in estimating the effect of numbers and wealth on school organization throughout the nation.

Nantucket, last by every named test, nevertheless maintains good schools. It is an island with a small population, mostly native-born, but diminishing for the last forty years with a dying industry. Level Barnstable, which is Cape Cod, has been nearly stationary in population for sixty years, while the rural population of hilly Berkshire has been dwindling for a like period. Suffolk has increased in population and wealth through vigor absorbed from Nantucket and Cape Cod and Berkshire and other rural homes, native and foreign.

Our metropolitan cities would soon perish if the tide of country blood did not restore their waste. Let it be noted that Barnstable, a stationary, rural county—not Suffolk, with its populous Boston—makes the best record.

In this immediate connection we may compare the moral conditions as indicated by the record of convicts in the State census of 1885, in which Dukes and Nantucket had no convicts; Barnstable, one convict to 5,969 population; Hampshire, one to 2,424; Franklin, one to 1,628; Worcester, one to 1,516; Norfolk, one to 1,502; Hampden, one to 1,342; Bristol, one to 972; Berkshire, one to 901; Essex, one to 879; Middlesex, one to 391; Suffolk, one to 319; Plymouth, one to 291.

At the other side of the continent the record of counties of nearly equal areas emphasizes the material power of density of population and resources.

By *money raised per child of legal school age*, four such counties in California rank (1890): Napa, Sierra, Alameda, Contra Costa. By *per cent. on taxable property* they rank: Sierra, Contra Costa, Napa, Alameda. By *ratio of average attendance to the school census*

they rank: Napa, Sierra, Contra Costa, Alameda. By the three tests combined they rank: Napa and Sierra alike, Contra Costa, Alameda.

Alameda, lowest of the four counties in the three aspects, contains the city of Oakland and has thirty school children to the square mile, and highly developed schools. Contra Costa and Napa have about five school children each to the mile, and the mountainous Sierra but two. Alameda pays annually the liberal sum of $4,500 for a superintendent, Sierra the meager recompense of $625, which represents a greater effort of the tax-payer and a greater expense per scholar than would be necessary to pay $10,000 in Alameda.

There are in New England more than five hundred schools averaging less than eight scholars each. Whatever is done with these pupils, their instruction frequently represents a vastly greater personal cost than gains credit in a comparison of teachers' monthly wages. Consolidation by transportation of pupils at public expense costs some $25,000 a year in Massachusetts alone.

Consolidation of districts is a partial remedy for weakness, but space itself may be a barrier. Even icy Maine and balmy Florida have each a thinly settled county larger than Connecticut.

We may often strengthen the school as a coöperative agency by attention to public comfort and convenience—for example, in the improvement of highways. The whole social life, including the schools, would be elevated by facility of neighborhood association. In the great corn belt of the United States it has been a common experience for travel on the country roads to be absolutely stopped by mud. It would hardly be extravagant to say that the drain-tile factories have done more in the last generation for the rural schools of central Illinois than changes in the school law.

The child in the villages and rural districts is privileged to be trained, in a degree, in industrious habits by his parents, and he gains a stock of knowledge inaccessible to his city cousin. A noted physician of Kentucky, familiar with the classics and modern languages, pointing to a cabin with a log sawed out on the side to admit the light, said: "All my schooling was in a house just like that, about ten miles from here, in Bourbon county. I attended lectures and took special lessons after I was grown up." The Congressional Directory gives a bit of biography of some four hundred men. An overwhelming proportion, as boys, had only common

country school privileges, but carried studious habits into mature life either with or without collegiate opportunity.

Maine, a State still quite homogeneous, with diversified rural occupations, perhaps best preserves the conditions general when Daniel Webster and his compeers had their early training in winter schools. The schools of the State averaged but little over twenty-two weeks in 1889 or 1890. Even the town high schools barely exceed an average of six months in the year, and the young people are busy on the farm and in the shops and teaching the yet humbler schools in the intervals; yet Maine does not take an inferior rank in a comparison of her men and women with those of other parts of the Union.

Within a few years industrial training has received much attention, but its popular development has been irregular and almost wholly in the line of manufactures. The rural schools of central Europe and Scandinavia have gardens and orchards for instruction; the school-house is the teacher's home, and his tenure is permanent. We omit these features in our imitation of the great European teachers, and attempt to copy Pestalozzi and Froebel's kindergartens without the gardens.

From the nature of things, professional teachers are absorbed by the strong schools. It would be helpful to all schools, including colleges and universities, if there were more opportunities for scholarly persons to devote brief terms to the best technical training before teaching. The high schools of Maine distinctly aim to be helpful to the rural teacher, and the State of New York encourages the academic and high schools to give pedagogic training. This is suggestive for parts of the country where similar work is not done. The movable Teachers' Institute does an important work, but, taking the country as a whole, it is extremely irregular in its character, more valuable in stirring up general interest than in improving individual methods.

The value of statute law varies according to its relation to the public will. While more supervision, with consolidation to township or county control, may be generally beneficial, those closely identified with the pine woods of the Southeast, the wind-swept prairies of the West, the mountain States of either slope, are the best judges of the adaptation of any step to their respective circumstances.

We must not forget the danger of too much legislation. We can force trees into beautiful hedges under rules that would destroy

building timber. Many laws secured in a period of rapid change presently bind like a Chinese girl's shoes, distorting further growth while they remain. The over-sanguine and those with special interests are too often eager for new statutes, but the tendency in our States is toward longer legislative vacations, and the community at large has a sense of relief at the adjournment of law-makers.

Necessities inexpensive in many rural districts, in the cities mean larger taxes. The annual fuel bill of the St. Louis public schools is not far from $25,000. For thousands of schools in the woods no account is made of fuel. Lots must be bought and substantial buildings must be erected in Southern cities. There are multitudes of Southern rural school-houses adequate for shelter from sun or rain erected by neighborhood effort, with so little money that they do not appear in any record.

Boarding around or distributing the cost of the teacher's maintenance in an indirect way, without contributing the money, can still be found in the effort of weak districts in New Hampshire and Pennsylvania. The laws of Georgia provide for ambulatory schools in regions where pupils are too scattered to be suitably collected in a permanent school, and the Scandinavians of the Northwest have maintained more or less instruction through teachers spending successive brief periods at different farm-houses and helping those who could gather about them.

Almost anywhere in the Union there is a belief that more money would greatly improve the schools. Sometimes the expression is accompanied by a belief that the people of a locality are already paying taxes to the extent of their ability and a recognition that public expenditure means additional taxation. In other cases there seems to be a vague idea that it is only necessary to appropriate money by some public authority to secure what is wanted. The variety of details to which different individuals would apply additional funds is suggestive: Some want money for school-houses, some to improve the equipment, some to pay higher wages to teachers, some for free books, some to extend the terms of school. In certain States there is a conspicuous call for money to pay the school officers for the time spent in school business. This is most pronounced in Virginia, where, in 1891, more than one-third of the county superintendents urged that the trustees be paid for the time devoted to schools sums varying, where specified, from one dollar a meeting to two dollars a day, with various limitations from

four to twelve days in a year. It is especially noticeable that the number of superintendents making this recommendation is more than double the number that made a like recommendation in 1890. A vast amount of work is done in the public interest by those who contribute their time for a few hours or more to the general promotion of the object in hand. Semi-public social organizations—scientific societies, for example—could hardly be maintained but for the zeal that leads members to accept official positions involving great labor without pecuniary compensation. The boundary line between the aid a citizen may fairly be expected to give a cause without pecuniary recompense and the aid which it is unfair to expect without such compensation varies with circumstances. If those directly interested are agreed in the policy of pecuniary compensation, and pay the bills thus incurred, the matter has only a general interest to students of social organization. If, however, local officers at present not paid are to be paid with funds drawn from persons not locally interested, as from a State or a national treasury or private benevolence, the effect upon the total outlay and upon general policy becomes more important.

The call for money from the denser communities, by tax or contribution, must not be too urgent. Many cities already pay a larger State school tax than is expended on their schools. This is the tendency in collecting taxes upon wealth and distributing them upon population. Cook county, Illinois, containing Chicago, pays more into the State treasury than it receives thence for its schools. Elsewhere specific grants are made to districts, as in California and Maryland, so that the strength of the strong is made positive to relieve the weakness of the weak. Many incorporated districts, both North and South, are very liberal in regard to tuition of pupils residing out of their limits.

Local interest is of prime importance. Without desire for knowledge and a marked degree of vigor in the recipients, external aid but hastens the dry rot of educational pauperism. Furthermore, thus far the rural districts have been able to concentrate their public effort mainly on their schools, while the cities must also maintain expensive water, fire, sewer, paving, lighting, and police departments, and the agents of city benevolent societies scour the country for means to help those below the reach of city schools. The chief reliance must be in intense self-help and the unlimited patience of earnest friends.

It is a question whether the inadequacy of rural schools is as serious relatively as some suppose. Many cities are unable to supply room for all their pupils, and in general city schools have much teaching to do to give the pupils a knowledge of nature equal to that with which the country child begins his school days. Waiving this view, however, it is manifest that the man or the family that goes out of a community whose institutions are fully established to try the fortune of developing mines or farms in new regions cannot expect to have the old communities maintain their own current schools and churches and maintain complete duplications for isolated pioneers. The weakness of the rural school is often but the inevitable weakness of all social life in the region where there are neither numbers to inspire the band of pupils nor money for wages of the teachers. Scores of frontier counties are without organization for the simplest municipal functions. In many a location, both those hopeful under new settlement and those despondent in the decline of abandonment, there seems to be no prescription needed for the school as such. As the physician would say, the disease is constitutional and its local manifestations will diminish as the patient improves. In other words, whatever tends to the general welfare of weak communities will tend to give character and value to their schools.

SIGNALING BY MEANS OF EXPLODING LEAVES.—Among the Iroquois there is a word applied to persons of either sex who go out into the woods to meet lovers and who by this means indicate to their paramours their love or their presence. In Tuskarora-Iroquois this word is, for the third person masculine singular, "ra-'ĕⁿr'-'ähs," *he strikes a leaf.* To produce the sound the leaf, commonly of the basswood or other tree having large leaves, is placed on one of the hands held in the position for indicating the letter *o* in the "deaf and dumb alphabet," and then with the other hand held flat striking the leaf sharply enough to cause it to burst with a report. There may be a general code of signals produced by this means to indicate the person making the sounds, his or her desires, or other like desirable things, or it may be the means agreed upon by two or more interested persons of carrying on a clandestine intrigue. Data are wanting to decide this question.

J. N. B. HEWITT.

ARCHEOLOGIC EXPLORATIONS IN MICHOACAN, MEXICO.

BY F. PLANCARTE.

NOTE.—The following notes relate to a very interesting exploration of archeologic remains conducted by Prof. F. Plancarte of the College of San Joaquin, Tacuba, Mexico, in the year 1889. A series of objects of gold, copper, shell, stone, and pyrites, together with a set of eight photographs of articles of metal, clay, and stone, were forwarded to me for examination. The translation is not a literal one, being a compilation from several letters, but expresses the facts with sufficient clearness and detail.

W. H. HOLMES.

"The site of my excavations was a slight elevation almost at the southern extremity of the valley of Zamora, four miles southwest of the city of that name and two miles west of the present site of the Indian village of Tacona. This eminence is composed of two natural hills, called in local phrase 'The Great Cat' and 'The Little Cat.'

"Being a student of American antiquities, and especially of those of my own country, I wished to make some excavations in order to obtain authentic specimens with which I might form a small archeologic collection to serve as a basis for my study of this science, and I chose the spot referred to because I had heard from the workmen of the region that at one time great cinerary urns of earthenware had been found in the skirts of the hills.

"Repairing to the place, I found on the principal hill, on a little plateau forming its top, a conical tumulus from four and a half to five meters in height by eight meters at the base, which communicated by an embankment with another elevation of square form having a base about equal to the diameter of the cone and of the same height. I began the excavations at the cone and shortly stumbled on a clay tripod. Continuing in the same direction, there were found walls made of cobble-stones not held together by mortar or cementing matter of any kind. These walls formed a square in the interior of the cone, which was filled with human skeletons at equal distances from each other and on the same plane; but, either

because the sepulchral chamber had been covered with wood and reed matting supporting earth and stones which fell down on the bodies when the wood decayed, or because the earth and stones were thrown on the bodies at first, the bones were commingled with débris, and many of them were reduced to powder and a large part of the earthenware was broken.

"It was not possible to examine the bones minutely, because they crumbled to powder on contact with the air; but the greater number of the teeth discovered, especially the molars, indicated adults considerably advanced in age.

"In a corner of the square enclosure there was a small structure of burned brick, which contained various bones in part carbonized or calcined; among them parts of the cranium (the parietal bones—the occipital and frontal), parts of tibias, ribs, femur, etc., of a single skeleton. On the fragment of cranium no trace of suture is seen between the parietals, and the molars, almost flat on the surface, indicated the great age of the deceased. In this enclosure, amid some half-carbonized utensils and shell ornaments, instruments of copper and earthen vessels, I found the gold films or plating and some five or six fragments of gilded beads, all mingled with ashes, pieces of coal, and carbonized remains of textiles. Skeletons were found not only in the walled enclosure of the cone, but also outside of it, among them being the remains of a young child. Mingled with the bodies were remnants of wood and matting which probably belonged to the roof. Quite close to the crania I found a very thin coating of a red substance which I took to be the coloring matter that served to paint the face of the dead.

"All of the objects found could not be got out entire and many crumbled on contact with the air. This is true especially of articles of copper and shell. Various utensils of red and black earthenware were found. The designs on some are very simple, consisting of circles and semicircles. The greater part of these utensils are basins resting on three hollow feet which are furnished with small balls of stone or clay to produce a sound when shaken. One shows complicated and handsome designs in white, red, and black. Many other articles may be briefly enumerated: A clay pipe, representing the human figure; a musical instrument, also of clay, with a human figure at one end (fig. 2); another musical instrument of Mexican onyx; a small idol of clay (fig. 4); an idol of white onyx (fig. 3), 17.7 centimeters high, whose eyes are of an artificial blue paste,

and the two pupils and the corners of the lips of obsidian; a vessel with a human head in relief on the outside, also of onyx; three fish-hooks, four needles, many arrow-heads, hawk-bells of all sizes, a great number of little tubes, probably beads, a chaplet of very small beads, four tongs of various sizes, and numerous other objects, all of copper; a unique necklace of iron pyrites, some beads of which I send you; seven necklaces, one of small snail shells and the others of pectens and other varieties of shells, are included, together with many tubes made of some marine mollusk, and a *Busycon perversum* entire and without artificial work. There are many other kinds of ornaments and utensils of shell, the greater part of them closely resembling those described in your work on 'Art in Shell of the Ancient Americans.'

Objects of clay and stone obtained from a small mound, Michoacan, Mexico.

"An obsidian mirror polished on one side, circular in form, backed with an earthenware slab of the same diameter, and with the hollows of the imperfections on the unpolished part, which touches the slab, filled with soot, is interesting. Two hatchets of stone, three lance-heads, some arrow-heads, and some knives of obsidian may be added. Some vessels contained vegetal matter destined for food, and in others there were found lumps and dust of red and rose colored material.

"The excavations made on the contiguous pyramids showed hori-

zontal sheets of ashes and burnt earth a few centimeters in thickness, separated from each other by thicker layers of earth, without earthenware fragments or other articles. This led me to suppose that the monument was an altar.

"The skeleton found in the small angular enclosure of the mortuary chamber of the cone may be assumed to be that of the chief; the others within might be those of his kin and friends who were killed to keep him company in the other life, and those outside of the enclosure might be the remains of captives and slaves sacrificed while the funeral pyre was burning in the ceremony of the obsequies.

"The great moisture of the place and the action of time have completely destroyed most of the gilded objects, leaving only the plates or films, which I found in rather large numbers; a very few fragments of beads still retain the gilding. The material is crude earthenware, in some cases burnt, not in an oven, but in the fire that served for the burning of the body with which they had been buried and whose carbonized bones were found in the tomb.

"Excepting the bead fragments, plated with a thin film of gold, there is nothing in this sepulcher that might throw doubt on its pre-Columbian character. No trace was found of glass beads or of the numberless trinkets used in trade by the Spaniards or paid for services rendered them.

"This fact and the many vexations inflicted by the whites at the time of the conquest upon the Indians of Xacona—the province having been granted to the notorious Nuño de Guzman—forbid the idea that these sepulchers were built after European had been substituted for American art. The theory of the European origin of the gold-plating becomes still less plausible as the history of the conquest and colonization of Michoacan is better understood, when it is considered that before the middle of the 16th century all the Indians of these regions had embraced Christianity and were subject to the intolerance and excessive religious zeal of the Spaniards of that epoch. In subsequent centuries, when Christian customs had already taken root among the Indians, surrounded as they were on all sides by convents and by forts and farms of Spaniards, they could not easily have eluded the suspicious vigilance of the monks, soldiers, and landlords in celebrating rites of the nature of those that probably took place at the burial of the bodies found, which, as they required some time and preparation, could not have passed

unperceived in a place like 'The Cats,' open to the view of all the Spaniards, who in considerable number inhabited the surrounding treeless region.

"Neither can modern fraud be suspected, because I myself was present and actively inspected the work in company with Mr. Hunt, an American friend of mine, a lover of antiquities and well conversant with the Mexican language, so that there was no chance of deception by the workmen, who, moreover, had no motive for deceiving. In these regions the importance of ancient objects is so little known that all thought I was looking for nothing but treasure under the pretext of seeking antiquities, nobody being able to comprehend that the broken potsherds I brought to light had any value. To my mind there is not the least doubt that this gilding was a pre-Spanish art, and Mr. Hunt's conviction is the same.

"In another small elevation at the foot of the hill where I made the first excavations a skull was found with filed teeth. There were countless numbers of pieces of earthenware and three large cinerary urns which contained ashes without a trace of bones. In hese, perhaps, were deposited, according to the reported custom of the ancient Tarascans, the residue from combustion of the remains of warriors killed in battle. In one of these urns, the only one that could be preserved, remnants of painted figures were found. Here, as in the first tumulus, there was a square stone enclosure, and in its center were placed the urns in a row parallel with the east and west sides. Under a skeleton in the northeast angle I found fifty clay utensils of similar form, placed one above the other, the lower being larger than the upper. The central vase was accompanied by four others of various sizes and of the same figure.

"I send also some objects of copper and of shell from among those found. A shell tube and a copper cylinder still retains the carbonized or oxidized fragment of string that served to attach these ornaments to the garment or person. Special attention is due, in my opinion, to the small copper beads, which, mingled with bells, formed a collar. Of these I send you specimens, as well as others of shell and other material, together with the trinkets that were tied to them. There is an object of shell in the form of a semicircular band with two small holes at the free ends for suspension. The exterior surface is ornamented with three button-like nodes. In the museum of Morelia I saw similar objects, but at no other place.

"In the future I shall send you such things as I find, either in photograph or, if possible, the objects themselves, and you may rest assured that I shall send you nothing the authenticity of which is not sufficiently established. Unfortunately many persons, especially in the Capital, busy themselves in the fabrication of ancient objects, and for this reason I place no trust in any one but myself or in persons who can have no possible interest in deceiving me."

INDIANA ACADEMY OF SCIENCE.—At the eighth annual meeting of the Indiana Academy of Science, held in Indianapolis, December 28 and 29, the following papers of anthropologic interest were read:

Evidences of man's early existence in Indiana, from the oldest river gravels along the White Water river, by A. W. Butler.

The Crawford mound, by H. M. Stoops.

Notes on archeology in Mexico, by J. T. Scovell.

Ancient earthworks near Anderson, Indiana, by F. A. Walker.

Archeology near Tippecanoe county, by O. J. Craig.

Some Indian camping sites near Brookville, by A. W. Butler.

Remarkable prehistoric relic, by E. Pleas.

The mounds of Brookville township, Franklin county, Indiana, by H. M. Stoops.

Remarks on archeological map making, by A. W. Butler.

STONE-AXE CURRENCY IN BRITISH NEW GUINEA.—Although the native canoe-builders in the Louisiade archipelago work with adzes made of hoop-iron, the payment for their work is made in stone axes, ten to fifty of these being the price of a canoe. The stone axe is still the accepted medium of exchange in large transactions—pigs, for instance, and wives are valued in that currency. It is only fair, by the way, to mention that the purchase of a wife is stated by the natives not to be such in the ordinary sense; the articles paid are, they say, a present to the girl's father. In Mowatta, sisters are specially valued, as they can be interchanged with other men's sisters as wives.—Trotter in *Proc. Roy. Geog. Soc.*, p. 795, Nov., 1892.

MAN AND THE GLACIAL PERIOD.

BY W J MCGEE.

I.

Wheresoever workers assemble, there idlers gather to feast on the fruits of honest toil; a part are pitiable paupers, some traffic in unwholesome wares, others swindle the unwary under the cloak of honest dealing and cheat justice by specious pleas, and still others steal and rob. Thus the laborer is always the prey of the idler, and progressive mankind is handicapped by the burden of the helpless and the perverse.

In like manner the workshops and market-places of science are haunted by harpies; a part are the feeble of mind who always absorb but never produce, some starve and poison hungry minds with the husks of fiction and the lotus of myth, others foist falsehood on the unwary under the guise of science and hide from justice behind shields of skillfully-woven words, and still others scoff at reason and rob knowledge of its glory. Thus creative genius is the prey of intellectual parasites, and the progress of knowledge is hindered by the helpless and the perverse.

Anthropology is the youngest of the sciences, and even yet is barely crystallized out of the original magma of unsystemic thought; moreover, anthropology is the most complex and obscure among the subjects of knowledge, so that its field gives but treacherous ground even for the cautious student. Yet the science of man is peculiarly attractive to human kind, and for this reason the untrained are constantly venturing upon its purlieus; and since each heedless adventurer leads a rabble of followers, it behooves those who have at heart the good of the science not only to guard carefully their own footsteps, but to bell the blind leaders of the blind. The blind leaders are sometimes comparatively innocent traffickers in the imaginary, like unto the sellers of poison drinks, and sometimes the less pardonable deceivers of the unwary and defeaters of justice, like unto commercial swindlers; while the blind led are the dupes of the one and the victims of the other.

XUM

No question in anthropology is more enticing than that of human antiquity, and there is much writing on the subject—some good, more bad. In the latter class fall two recent publications, which have much in common. The first of these is Doughty's "Evidences of Man in the Drift;"[1] the second is Wright's "Man and the Glacial Period."[2] Both works profess to treat of the geologic antiquity of man, though neither author can be classed as geologist or anthropologist. The former is a numismatist, a member of the American Numismatic and Archæological Society, and makes no pretense of geologic skill or repute; the latter is a professor of theology in a theologic seminary, yet lays claim withal to geologic skill, which serves to render his writing the more specious.

II.

Mr. Doughty appears to have made a large collection of ice-wrought and water-worn pebbles and ferruginous nodules from the glacial drift, and to have found in their varied and curious forms suggestions of elaborate art. The ferruginous nodules are his most precious relics, abounding as they do in the fantastic forms of clay cemented by iron oxides. "To geologists these tablets are known as a variety of clay stones" (page 13); but to Mr. Doughty they are engraved tablets rich in records of the past. "They bear upon their flattened surfaces figures of human and animal forms, sometimes singly represented, but more frequently in groups," of which one "represents a man with Caucasian features sitting in the presence of several highly-colored individuals, who approach him with bowed heads. In each instance, either the seated figure holds a staff bearing the head of a serpent, or the staff is held before or behind him by another. The seated figure almost always wears an

[1] Evidences of Man in the Drift—a description of certain archæological objects recently discovered in Massachusetts, Connecticut, New York, Pennsylvania and New Jersey: read before the American Numismatic and Archæological Society, March 28, 1892; by Francis Worcester Doughty. New York: privately printed, 1892.

[2] The International Scientific Series. Man and the Glacial Period; by G. Frederick Wright, D. D., LL. D., F. G. S. A., professor in Oberlin Theological Seminary, assistant on the United States Geological Survey, author of The Ice Age in North America, Logic of Christian Evidences, etc.; with an Appendix on Tertiary Man, by Prof. Henry W. Haynes (fully illustrated). New York: D. Appleton and Company, 1892.

elaborate feathered crown resembling that worn by the Palenque figures" (page 10). "Having no desire to theorize," Mr. Doughty merely suggests that the scene represents "the ruler of the serpent clan, or totem, receiving homage from * * * subordinate tribes." "Many of these clay tablets are painted, but the arrangement of color, which resembles the Chinese style, is such as to render it very difficult to determine the nature of the scenes depicted." They are also patinated. A perplexing feature, however, is "the want of proper division between the figures," which is ascribed to a fundamental idea of "space economy," and which "to our eye creates hopeless confusion. The large figures are made up of many smaller ones, and the designs are hard to decipher. * * * A foot in one group is liable to serve as a head in another, the arm of one becomes the leg of another," etc. Moreover, "a specimen held one way shows one design, reversed another, turned again, still another, and so on up to four." Most readers will heartily concur in the author's qualified opinion that "it is hard to understand such artistic methods" (page 11). The sculpturing is not external alone: "Many of the tablets contain a layer of clay through the center. * * * This interior layer of clay presents a second face as perfect as the first, and in every case is found worked up with figures or painted;" and "the most perfect depictions of the human form * * * were found upon the inside clay surfaces of some of these stones." Mr. Doughty's active imagination is able to find not only "traces of animal matter" in the tablets, but "parchment or skin dressed in clay;" and upon this scroll "appears an excellent male head, a full figure of a very fat gentleman, and other devices" (page 12). In short, "these tablets appear to be simply the clay books of the men of the drift;" and this interpretation is sustained by a quotation from Job, xix, 23 (page 13).

The pebbles are hardly less significant to Mr. Doughty; many are heads in profile and full face; some bear "Indian figures and feathered head-dresses strongly marked. Others represent faces of a distinctly Caucasian type, and are often heavily bearded. Sometimes the beard is represented as a mere goatee, at others as being blown by the wind, at others still cut square after the Assyrian style." "Other heads have been found of strongly-marked negroid features and cranial shape;" and it is truly remarkable that the Caucasian pebbles are white, the negroid pebbles black and the Indian pebbles brown, and even more remarkable that the Caucasian heads

"wear hats of various recognized patterns" (page 9). Most striking of all is the solitary instance "of a white face with strongly-marked Celtic features, and a heavy red beard and moustache." The author suggestively adds, "I have found no representative of the cow, but of the man-headed bull I have several examples" (page 10). Other "existing animals" are "the dog, horse, sheep, rabbit, black bear, wolf, anthropoid ape, elephant, green adder, parrot and smaller birds, and the dolphin or whale." There are also many prehistoric animal forms, including "an animal of hippopotimus [sic] type, a large web-footed bird somewhat resembling the dodo, and, lastly, a reptile with a long snout and flattened paddle-like tail" (page 10).

Not content with proving the existence of man in the drift by these remarkable carvings, Mr. Doughty ventures to predict that the "Old Man of the Mountain, that gigantic human profile cut on the New Hampshire hills" (an imaginative sketch of which embellishes the work), was carved out "untold ages ago by the men of the drift" (page 15).

It should be added that Mr. Doughty rejects the "well-known glacial theory" and accepts the view of Ignatius Donnelly, that "the drift was suddenly thrown upon the earth either by the contact of our planet with a comet or by some other agency not understood" (page 7).

In brief the book is a bundle of absurdities worthy of notice only because it is representative of the vain imaginings so prevalent among unscientific collectors and because its maleficent influence has been multiplied by favorable press notices.

III.

The Reverend Professor Wright begins with an introductory chapter, in which he discusses the characters of existing glaciers. He says: "A *glacier* is a mass of ice so situated and of such a size as to have motion in itself. * * * Upon ascending a glacier far enough, one reaches a part corresponding to the lake out of which a river often flows. Technically this motionless part is called the *nêvé*. * * * The *nêvé* is the reservoir from which the glacier gets both its supply of ice and the impulse which gives it its first movement" (pages 2, 3). Unfortunately the author does not indicate how a moving body can have a motionless part, nor how

it receives both matter and motion from this motionless part. He fails, in short, to indicate what portion, if any, of his statement is true.[1]

The second chapter treats of existing glaciers and the third of glacial motion, and in so far as they are made up of quotations from trustworthy observers are worthy of high confidence. It is to be regretted, however, that the quotations are not more extensive and in some cases better selected—for example, the observations of Sir Wyville Thompson in the antarctic region are ignored. It is to be regretted even more deeply that the author speciously defends his own blundering attempt to measure the rate of ice motion in Muir glacier instead of accepting the excellent series of measurements by Professor H. F. Reid. In 1886 he sought to measure the movement of this magnificent glacier by "observations * * * with a sextant upon pinnacles of ice recognizable from a base-line established upon the shore" (page 47), and obtained a value of 70 feet per day. In 1890 Professor Reid measured the ice flow at the same season by theodolite readings on a line of flags at approximately equidistant points across the glacier, the observations being made from two stations on opposite sides of the stream. Two independent series of readings were made, each covering a period of three or four days; and partly for the reason that they were designed to correct a manifest error, the observations were made with exceptional care. The measurements show that the daily motion ranges from a few inches near the sides to about 7 feet toward the center, the mean being 4 or 5 feet.[2] The reverend professor seeks to impugn this excellent work by specious arguments (page 47), and even falsifies Reid's record by speaking of "ten feet per day in the most rapidly-moving portion observed," while Reid's highest figure is 7.2 feet.

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[1] Our foremost glacialist, Professor T. C. Chamberlin, says of this remarkable exposition: "As a matter of fact, the névé moves like other parts of a glacier, and the signs of such motion are indicated in the cut on the very page before the reader as he follows this astonishing statement. The motion of the névé has been a matter of common knowledge for half a century, and is absolutely beyond question. The comparison with a lake is wholly misleading, and evidently springs from a fundamental misconception of a glacier."—The Dial, vol. xiii, 1892, p. 303.

[2] Nat. Geog. Mag., vol. iv, 1892, page 44.

Chapter IV is devoted to "Signs of past glaciation." These signs are enumerated as (1) scratches upon the rocks; (2) extensive unstratified deposits; (3) transported bowlders; and (4) extensive gravel terraces. The chapter is elementary if not puerile, and is characterized by egregious and misleading egotism. It purports to summarize the work of a large number of geologists in different countries, chiefly in the United States, yet but two American geologists are mentioned, while the first personal pronoun appears in a score of places, sometimes in deceptive connection. Thus he says (page 62): "I have traced this limit of southern bowlders for thousands of miles across the continent, according to the delineation which may be seen in the map in a later chapter;" and again he extols "our map" and depreciates Professor Chamberlin's earlier mapping by comparison; while in fact his map is little more than a reduction of a map published by Chamberlin years before, and the Reverend Professor Wright never followed "across the continent" any of the lines indicated upon it and never made any observations in the entire region which are accepted with confidence by leading American geologists. Moreover, the enumeration and description of "signs of glaciation" is reprehensibly incomplete and archaic. Probably the most trustworthy and certainly the most widely-spread evidence of glacial action is found in topography. The American drift is known to be of glacial origin not only from its similarity to the moraines of living glaciers, but from a distinct surface configuration, entirely different from that produced by water or any other geologic agency except ice; and extensive drift-free areas are characterized by a topography which could not have been produced by running waters, or by any other agency except moving ice. It is the function of geology to interpret these topographic forms through that branch of the science known as "geomorphy," or sometimes as the New Geology; and much of our knowledge concerning the glacial history of the continent has been acquired thereby; but there is nothing in the Reverend Professor Wright's numerous writings to indicate the slightest comprehension of the principles of geomorphy.

In the fifth and sixth chapters "ancient glaciers" are described at dreary length; for the description is a mélange of crude observation, misleading quotation, and deceptive egotism. Within a generation glacial geology has made great strides, and nowhere has the progress of the science been more rapid than in the United

States. One of the results of the brilliant researches by Chamberlin, Winchell, Salisbury, Gilbert, Smock, Leverett, and other geologists is the recognition of a complex glacial history, including two, three, or more distinct ice invasions separated by intervals of mild climate; a history so complex and long-continued that, according to the independent estimates of different geologists, if the postglacial period is represented by unity, then the period which has elapsed since the beginning of glaciation must be represented by two figures. But this conclusion of modern science is not recognized by the Reverend Professor Wright save when he seeks to conceal its evidence, and through a specious combination of quotation and suppression to misrepresent the views of competent geologists. Thus his description is superficial and warped, and his conclusions are worthless or unintelligible. A generation ago the description and conclusions might have passed for science; to-day they rank as charlatanry.

The seventh chapter, "Drainage systems and the glacial period," is a systemless catalogue of a wide variety of interesting but distantly related facts. It is the function, and indeed the end, of science to classify phenomena in such manner as to indicate natural relation; but the arrangement in this chapter, if arrangement there be, is not such as to set forth natural relation, or geologic history, or science, but such as to conceal relation and give a false air of simplicity and unity to glacial history, and thus to contravene modern science. For example, the author refers to Winchell's work on the recession of the fall of St. Anthony at length (pages 209, 210), but in such manner as to suppress Professor Winchell's conclusions as to the bipartition of glacial history; and on later pages (233–237) he quotes Russell and Gilbert on the fossil seas of the Great Basin in such manner as to convey an impression of fairness and completeness, yet in such terms as to conceal their conclusions concerning the bipartition of the lacustral history of this part of the continent.

To the anthropologist the interest of the subject to which the work is nominally devoted centers in the eighth chapter, "Relics of man in the glacial period." The instances in which "the relics of man are directly and indubitably connected with deposits of this particular period east of the Rocky Mountains" (page 254) are (1) the Abbott argillites from the Trenton gravels; (2) the Metz "paleoliths" from Madisonville and Loveland, Ohio; (3) the Cresson "paleolith" from Medora, Indiana; (4) the Mills flint from Newcomerstown, Ohio; and (5) the Winchell-Babbitt quartz chips from

Little Falls, Minnesota. In addition he introduces in evidence (6) the Cresson argillite from Claymont, Delaware; (7) the Calaveras skull and other relics from the Pacific coast, and (8) the Nampa figurine from Idaho, with the implication that the first of these indicates the existence of early glacial or preglacial man and the others preglacial or Tertiary man—the implication being deceptively guarded, however, by indefinite expressions and meaningless cross-references.

Now the first mentioned instance (the Abbott argillites) cannot be accepted by reason of the recent splendid work of Professor Holmes, who has shown, *first*, that the supposed paleoliths are not finished implements, but work-shop rejects or blanks; and, *second*, that there is grave reason for questioning whether the objects are not confined to the modern talus—*i. e.*, whether they occur in the Trenton gravels at all.

The second instance was formerly accepted by archeologists as evidence concerning the distribution of the hypothetic glacial man whose existence was supposed to be proved by the Trenton and Little Falls testimony; but since the occurrences are isolated, since the finder is not a skilled geologist able to discriminate between undisturbed glacial deposits and the talus derived therefrom, and since in one case similar objects occur on the surface above the point at which the "paleolith" was found, the presumption is against the evidence and the "finds" cannot be accepted as proof of the existence of man during the glacial period. The same must be said also of the third and fourth instances; and in connection with the last it is necessary to observe that the indirect personal statements of the Reverend Professor Wright (page 251) are unworthy of confidence partly because they are indirect, partly because his incompetence as a geologist is tested by another of his "instances" (the Nampa figurine).

The fifth instance (that of Little Falls) must be rejected because Professor Holmes, with Professor N. H. Winchell, who first found artificial flakes in the surface sands at this place, has within the year shown by means of excavations and extended surveys that there is no implement-bearing stratum at the locality in question, and that the quartz chips are confined to the talus and to the surface soil and subsoil within reach of the windfall excavations now pitting the surface of the glacial terrace. It is painful to learn that a conscientious observer like the late Miss Babbitt should be at fault in a matter of

so grave import; enough to say that the original discoverer accepts Professor Holmes' conclusions.

The sixth instance (Cresson's Claymont argillite) must be rejected, *first*, on the ground of inherent improbability, because its acceptance would at once multiply human antiquity by 10, 20, or 50; *second*, because of the presumption that the object really occurred in the talus;[1] and third, because of the utter lack of definitely corroborative testimony. It is to be observed that Professor Wright's personal plea concerning this instance is incompetent, irrelevant, and immaterial because his conception of glacial history is without time basis—he fails to recognize the succession of widely-separated episodes of which the glacial period was made up. His expressions, too, are misleading; his declaration that "both Mr. McGee and myself have visited the locality with Dr. Cresson, and there can be no doubt that the implement occurred beneath the Columbia gravel" (pages 258, 259), conveys the idea that the three parties named concurred in the observation and the conclusion, while as a matter of fact no more than two of the trio were ever on the ground at the same time, only one made the original observation, and one at least emphatically repudiates the conclusion that the "implement," if implement it be, occurred underneath the Columbia gravel. The distortion of fact in this declaration smacks of the shyster.

The seventh instance cannot be accepted by any cautious archeologist at the apparent value assigned by the reverend professor. There is, indeed, a large body of testimony concerning the association of human relics in auriferous gravels beneath broad lava sheets on the Pacific coast, but the gravels and lava sheets have not been correlated with the glacial deposits of eastern United States or Europe, and their antiquity, either in years or in terms of geologic chronology, has not been determined.

The eighth instance (the Nampa figurine) is the most satisfactory of all, since it affords a measure of the competence on the Reverend Professor Wright as a geologist and as a reasoner of the important subject of the antiquity of man. It is alleged that in 1889 the figurine, a brittle, baked-clay image as fragile as a clay pipe-stem, was brought up in the sand pump used in connection with a heavy drill in boring an artesian well at Nampa, Idaho, from a depth of 320

[1] The presumption implicitly accepted by Mr. Cresson in a recent publication—Science, vol. xx, 1892, page 304.

feet and beneath a heavy lava sheet. Now, it is a fact that one of the best-known geologists of the world chanced to visit Nampa while the boring was in progress, and the figurine and the pretty fiction were laid before him. He recognized the figurine as a toy such as the neighboring Indians give their children, and laughed at the story; whereupon the owner of the object enjoined secrecy, pleading "Don't give me away; I've fooled a lot of fellows already, and I'd like to fool some more." The geologist in question gave no further thought to the matter, knowing that so transparent a fraud would never deceive even a tyro in geologic science; but when it came to the notice of the Reverend Professor Wright he accepted the fiction and far outstripped the jocular finder by foisting it in the public print as evidence of great human antiquity. It may be added that while the figurine has attracted much attention among archeologists, several (including Professor Holmes) refused to accept it even as prehistoric because of the suggestion of classic models found in its lineaments.

In short, chapter VIII is a tissue of error and misrepresentation; not one of the "indubitable" instances is worthy of credence; and its publication to the world as an exposition of American science is an offense to the nostrils.

Two chapters follow on "The cause of the glacial period" and "The date of the glacial period;" it is enough to say that they are of a piece with the earlier chapters.

The work ends with an appendix on "Tertiary man," by Professor Henry W. Haynes, which, albeit short and from the geologic standpoint superficial, is a silver lining to the cloud.

In brief, the introductory chapter of "Man and the glacial period" is absurdly fallacious; the chapter on existing glaciers is redeemed by quotations, but the chapter on "glacial motion" is damned by error and specious misrepresentation; the chapter on "past glaciation" is crude, unjust, egotistic and a generation behind modern science; the fifth, sixth and seventh chapters contain a large body of information which would be useful if properly arranged, but the arrangement is unscientific, unfair to American geologists, and misleading to readers; the eighth chapter purports to prove that man existed during the glacial period, but the evidence is inconclusive, and only proves, *first*, that the author is incompetent to deal with geologic phenomena, and, *second*, that his conception of geologic history is feeble and hazy; while of the concluding chapters it must

be said, tritely yet truly, that nothing that is true is new, and nothing that is new is true.

It would be charitable to allow the arraignment of the work to end here with the implication that the author in his ready acceptance of untrustworthy evidence and his apparent distortion of the views of geologists is a simple enthusiast, a gull rather than a vulture; but it is due to scientific truth to point out evidently intentional deception on the title page. The imposing list of titles which the author appends to his name conveys the impression that he is a geologist rather than a theologian, which is misleading; that he is a professor of geology, which is not true; and that he is an "assistant on the United States Geological Survey," which is sheer mendacity and theft of reputation. The character of the book is indicated by the many errors and misstatements; the character of the author must be gathered from the inherent evidence of his incompetence, the scores of misleading statements, and the apparently deliberate falsification of facts on his title page.

IV.

The two treatises have much in common; both represent the work of the harpies by which the workshops and market-places of science are haunted; both are misleading and pernicious, and both handicap science and hinder the progress of knowledge. Yet there are differences between them: Doughty's work is confessedly extra-scientific, or infra-scientific, and hence will receive little attention outside of the few ill-trained collectors of fantastic objects into whose hands it may fall; while Wright's work represents a stage of science, albeit a primitive stage, and will thus find more frequent readers and work the greater injury. Again, Doughty's pamphlet is privately printed and thus bears the impress of Gilead, while Wright's book is issued by a reputable house as one of an international scientific series, whereby its maleficence is multiplied. Furthermore, Doughty's conclusions are disproved by their absurdity; but some of Wright's conclusions are not *a priori* absurd, and their falsity can only be shown by geologists and anthropologists, whom it behooves to caution laymen and learners against the man and the book. Doughty is a simple-hearted quack whose bread-pills but tickle the fancy of weakling dupes; Wright is a betinseled charlatan whose potions are poison. Would that science might be well rid of such harpies, especially the latter!

BOOK NOTICES.

Contributions to North American Ethnology, Volume 7. A Dakota-English Dictionary by Stephen Return Riggs. Edited by James Owen Dorsey. Washington: Govt. Printing Office. 1890 [1892].

The original "Grammar and Dictionary of the Dakota Language," collected by the members of the Dakota Mission and edited by the Rev. Stephen R. Riggs, appeared in 1852 as vol. IV of the "Smithsonian Contributions to Knowledge." It contained a grammar of 64 pages, a Dakota-English and an English-Dakota dictionary, and was, until very recently, to be regarded as the greatest work of its kind ever published.

After a lapse of forty years a new and enlarged edition of the Dakota-English part has been sent forth, and we are promised in the near future a new edition of the grammar and of the English-Dakota part. This time it is the U. S. Geological Survey that does the scientific world the service of issuing the work. It is a most valuable service too, since the edition of the old work was exhausted years ago (he who desired a copy could obtain it only through a bibliopole at an exorbitant price), and in the meantime students of the written language of the Dakotas—philologists, teachers, missionaries, educated Indians—were constantly increasing in numbers and the demand for the work was advancing.

Much of the new material in the present volume is the work of the editor of the original volume, the late Rev. S. R. Riggs; but more of it seems to have been contributed by the Rev. Messrs. Cook and Cleveland and by those worthy sons of illustrious sires, the Revs. Alfred L. and Thomas L. Riggs and the Rev. J. P. Williamson. The labors and rewards of the great Dakota Mission have been hereditary. The editorial supervision of the work has fortunately fallen to the learned care of the Rev. J. Owen Dorsey.

The new Dakota-English dictionary contains 665 pages; the old contains but 276, and both are quartos of nearly the same dimensions; but the new is not so much the more copious as might appear from these figures; it has larger type and wider margins than the other and it has but 38 lines to the column, while the old has 55.

The old edition, we are told, contains about 16,000 words, but we are not told how many the new contains. In order to arrive at some idea of the extent to which the dictionary has been increased, the writer counted in each volume the different leading words beginning with one of the following eight letters: c′, g, k, p, t, u, z, and z′. These letters were selected to save labor, as the words beginning with them are few. There are 305 such words defined in the old volume and 392 in the new, an increase of 87 words, or about 28 per cent.

In examining these additional words it is surprising to find that the great majority of them are dialectic—mostly from the Teton dialect; very few seem to belong to the Dakota language in general or to the Santee (Isaŋti), dialect which the writers of the old dictionary chiefly sought to represent. Of the 87 words referred to, only about 16 are not dialectic. This shows how thoroughly the pioneer members of the Dakota Mission did their scholarly work, and if further evidence of this were needed it might be found in the rarity of instances in which the definitions show amendment in the new volume. The dialectic additions, beginning with the eight letters referred to above, are about 71, or over 23 per cent., added to the old dictionary; but these additions are only of words used as headings and followed by definitions. Besides such, many dialectic synonyms are presented which follow the definitions and do not appear as headings. In a number of instances the dialectic word differs from the standard word only in one or two interchangeable consonants or in the addition or subtraction of the nasal ŋ.

It would be presumption in any one, even in one to whom the sonorous Sioux is a mother tongue, to imagine he could correct anything in this great work; yet, emboldened by the example of the school boy who differed with Webster, the writer has allowed himself to fancy that in a few instances he could improve the definitions; but he will not dare to mention all of these instances, lest confusion and shame should eventually overtake him. The following will suffice: The *Psoralea esculenta* (Pursh), the *Pomme blanche* of the French Canadians, the tipsiŋna of the Dakotas, is referred to under two headings (owobopte, tipsiŋna,) as "Dakota turnip," and under two other headings (bopta, owopte,) as "turnip." In the English-Dakota part of the earlier publication tipsiŋna is given as the Dakota equivalent for the English word turnip. This is misleading. The

Psoralea esculenta belongs to the *Leguminosæ* or Pulse family, and is far removed from the true turnip in its botanical characters. Hewáktokto is *not* the Dakota name of the Arickaree Indians. This is a point on which the reviewer has reason to believe himself specially fortified, and therefore ventures with some confidence to differ with the "Dakota-English Dictionary."

It is to be regretted that Dakota local names, which no one could so ably translate as the lamented author of this work, are not more numerous in the dictionary. W. MATTHEWS.

Atlas der Völkerkunde. Fünfzehn Kolorierte Karten in Kupferstich mit 49 Darstellungen. Bearbeitet von Prof. Dr. Georg Gerland, Strassburg. Gotha: Justus Perthes, 1892.

This meritorious work, with its vast assemblage of details, may be called unique in its execution, though not in conception. It is an enlargement of the ethnological or seventh part of Heinrich Berghaus' "Physikalischem Atlas," and Berghaus' maps are here so thoroughly recast that even their outlines are scarcely recognizable, for modern research has made too many additions necessary.

Preliminary remarks are added in form of a preface, and their perusal is absolutely necessary for the comprehension of the maps. These are subdivided into little squares by lines drawn from east to west and by other lines intersecting them vertically, so that any name mentioned in the index can be found by consulting the squares.

One planiglobe serves to represent the color of the skin in the different races, another that of the hair, of which there are two great subdivisions, straight and curly. The density of the population is very graphically represented by the increasing density of the shades. Religion, religious conceptions, endemic distempers, epidemics of the nineteenth century, dress, foods, human occupations and dwellings fill each one planiglobe. Then come the races, nations, and tribes of the five parts of the world, represented on seven full-size maps, with cartoons on the margins showing tribal distribution in mountainous or other countries where the races are more mixed than in others, all of special interest to the ethnographer.

The languages of the world are represented, some by stocks, others by groups of stocks, and eleven colors are employed to show their principal elements. Six cartoons are added on the margins.

The volume closes with a racial map showing the distribution of

the national bodies at a period of from 100 to 150 years after Christ, which may serve as a linguistic map as well.

Gerland is careful in distinguishing the medley languages from the hybrid languages, some of the latter being Negro-English, Negro-French, and Chinook Jargon; and on the other side from the unmixed or comparatively unmixed tongues, as Roman, Russian, Swedish, etc. He also assumes typical groups of languages, which may enclose radically divergent languages; thus Australian is grouped with the Oceanic dialects.* Abandonment of one language to adopt another is a curious feature, examples of which are carefully recorded.

Craniology is not adopted as a means of classification by Gerland, but for the skin he assumes two main types: a fundamental *brown* one, from which darker and lighter shades have developed, and the light reddish type which we commonly call *white*.

No subdivision of the pagan religions was attempted, but if any is possible the ethnic one would be more satisfactory than any other. Some customs founded on religious ideas are mentioned, and the remarks are of great interest.

Endemic distempers are shown to be intimately connected with characteristics of soil, climate, and temperature, whereas epidemics are spreading over whole continents without restraint. Dryness and cold are unfavorable to the development of microbes, hence of sickness. Diseases almost always proceed from east to west; some are wafted about by winds, others carried about by man himself through his ubiquitous peregrinations. The two chief types of dress are the tight-fitting boreal and the tropical one, loose and thin. Our citizens' dress approximates more to the boreal type.

The racial and linguistic maps of the two Americas are of special interest to us. Gerland and others regard the Eskimos as true Americans, who once pushed their way northward and did not arrive from Asia, though in his mind America was one of the latest portions of the world to receive a human population. The Cherokees are correctly represented to be of one family with the Iroquois and Hurons, but his Koshati (for Koassáti) are wrongly placed on the Chatahoochee river. The Lipani on the Rio Grande should be spelt *Lipans*. The Towiaches were originally identical with the Wichitas and with the Towakoni, but Gerland puts all of these into four different locations, the one on Canadian River being nearly

* Classifications like these are too hazarded not to be considered as failures.

correct. The Adayes should be omitted altogether as making up a separate family, for they spoke a Pawnee or Caddoan dialect. The Tonika can be historically traced to three locations, but none were on the Gulf coast where Gerland has them. Punka is bad orthography for Ponka, and Konsas for Kansas. Paduka should be identified with Comanche, and "Füchse" (the Fox tribe) with Muskwakiuk. For transcribing foreign names Gerland has made use of Lepsius' "standard alphabet." Some curious mistakes occurred to him while doing so; *e. g.*, he writes the Zoques of Central America (or "the hairy ones") Zokwe; the Sikaqua, Sikakwa, whereas they should be pronounced Zoke, Sikawa. His "Hiakwi" on Yaqui River is pronounced Yaki.

The specialist in ethnics and linguistics will find many other statements that will perplex him and make identification with the present tribes difficult. But as a German the professor had to contend with many difficulties which we do not experience in this country; and as one of the first modern attempts to delineate the racial stocks and reunite, in many instances, the scattered remnants of the world's nations and tribes by graphic means, the atlas before us deserves praise, and will figure as a standard work of modern research in some of its more elaborate portions. The results of Powell's investigations and those of his staff of ethnologists have been well considered.

A. S. GATSCHET.

The Land of the Cliff Dwellers. By Frederick H. Chapin. Boston: W. B. Clarke & Co. 1892. (*188 pp., maps and plates.*)

Notwithstanding the fact that the cliff dwellings of our Southwest have been more or less the subject of research during the last half century, the only volume devoted exclusively to them, aside from the reports on the ancient ruins in southwestern Colorado by Messrs. Holmes, Hoffman, and Jackson, of the Hayden Survey, is the one before us.

After describing the arid waste which the builders of the cliff villages occupied, the author enumerates briefly the explorations of the early Spaniards from Marcos de Niza in 1539 to Espejo in 1582, and gives a sketch of the conquest and colonization of the newfound land by Oñate and Vargas. A chapter is devoted to "Anglo-American exploration," another to "wild tribes," while a third treats of "Pueblo tribes." This portion of the volume is compiled mainly from the *relaciones* of Castañeda and other early Spanish

chroniclers, besides the writings of Bandelier, H. H. Bancroft, Winsor, Bourke, and Gregg, and in this compilation the writer's ability to separate the wheat from the chaff is well displayed. But the principal part of the work is the result of personal observation in the main and tributary valleys of the Rio San Juan. Although the volume does not claim to be a scientific treatise, the archeologist may well rejoice in the possession of a hundred pages or more of accurate description of the vestiges of an ancient pueblo culture, which vandalism threatens soon to destroy.

Many of the author's conclusions are refreshing, for he rejects the old theory that the dwellers in the cliffs were other than the ancestors of our living Pueblos. He asserts, in accordance with newly discovered evidence, that the "Montezuma" of the Pueblos is purely mythic, and that New Mexico was not discovered by Cabeza de Vaca, but by the negro Estevan under Marcos de Niza.

Accompanying the descriptive text are three maps, a dozen excellent full-page heliotype engravings, besides some fifty-five half-tone plates illustrative mainly of cliff villages or of various features of their architecture, pottery, basketry, etc., from photographs by the author. The scientific value of the work will increase with its age. As a specimen of the book-maker's art it could scarcely be excelled. F. W. HODGE.

Bibliography of the Algonquian Languages. By James Constantine Pilling. Washington: Government Printing Office. 1891 [1892].

What book can be drier, duller, or drearier than a catalogue of books? Even when the catalogue is excellent, even when it rises to the higher level of bibliography, and on this higher plane rises to the summit of excellence, how can it be interesting? The street directory is a most useful book, and so is the dictionary, and the gazetteer; but is it not a strain on the imagination to call these books interesting? They may be likened to our ticket agents at the transfer stations, to whom we hurriedly go in rain or shine or cold or wet and from whom we unconsciously expect instant and perfect attention to duty, and only become conscious of the man in the rare instances when the usual routine duty is not instantly and perfectly done. The bibliographer is our transfer man, and when he does his work thoroughly, completely, and unceasingly we are hardly conscious of his existence.

For more than twelve years the Bureau of Ethnology has had its

faithful transfer man unceasingly on duty. He is its bibliographer, and his name is James Constantine Pilling, the sixth of whose excellent bibliographies on Indian languages has recently appeared.

Beginning in 1879 with the preparation of a list of books giving information about Indian languages, the work grew and grew, and finally, in 1885, a fat quarto volume of 1,200 pages, the "Proof-Sheets of a Bibliography," was born. Had this been the end of the work begun six years before, it would still have been a worthy end. But it was not the end; it was rather the finish of but one chapter, the preparation and completion of which pointed the way to other and better chapters. The world gained a prosy but very useful document, and Mr. Pilling and the Bureau of Ethnology gained a valuable experience, which clearly pointed the way to a still more useful work, upon which he promptly entered.

The new work was classification and separate publication. When the work of collecting was begun nobody could guess how big a pile would be gathered. The publication of an unwieldly quarto and the quantity of material which flowed in after printing began showed clearly that classification must be begun. It was thereupon decided that a series of bibliographies should be prepared. Each one was to consist of a list, as complete as possible, of all the books, papers, manuscripts, magazine articles, reviews, etc., ever known or heard of, containing information about the language of some one group of North American Indians whose language was the same or simply variants or varieties of the same—in the language of the anthropologist, one linguistic stock. Now, there are fifty-seven such stocks, and the Algonquian bibliography before us is the fifth one that has been compiled by Mr. Pilling and published by the Bureau of Ethnology.

It is the largest and in some respects the most important of the series. It deals with those Indians with whom the whites were first and longest in contact and who dwelt in the regions now so thickly settled by the whites. If one would know the meanings of the Indian words scattered over all the northeastern and northern middle United States and around the Great Lakes and in Canada, here he will find the key to the literature. If he cares not for Indians or their language, he will find interesting details about early printing in New England and nearly a hundred fac-simile reproductions of title-pages of curious and rare old pamphlets and books in the rugged and forbidding gutturals of New England Indians; and even if book-making does not interest him, he can see here concrete illustrations of the grim religious views of our forefathers, and how de-

voted they were to the saving of red men's souls. Thanks to their zeal in this, they learned the Indian's language, manners, and customs, translated the Bible into his language, wrote pious primers and sermons in his tongue, and so unintentionally gathered and preserved material which the scholar can now use in formulating the laws of man's progress from savagery onward and upward through barbarism to civilization.

The 82 fac-simile title-pages scattered through this 600-page book are full of instruction. For the antiquary they are more, they are interesting. The writer who would make a good title-page can here find numerous examples—*not* to be followed. Witness the fac-similes of the title-pages of Adriaen van der Donck's Description of New Netherland, with its seal containing the frightful and frightened mammal that may pass for cat, fox, porcupine, or —?

The book called *The Hatchets*, printed at Boston in 1705, solves the title-page problem by having none at all; but beginning without it or dedication or introduction or preface or contents or anything, we have page 1, and without head-lines:

> The Hatchets, to hew down the Tree of Sin,
> which bears the Fruit of Death.
> OR,
> The LAWS, by which the Magistrates are
> to punish Offences, among the *Indians*,
> as well as among the *English*.

The writings of apostle John Eliot naturally occupy a conspicuous place in the work. These pious books, the outcome of a burning zeal to save pagan souls, have in our time become exceeding scarce and are eagerly sought and prized. Of the 1,000 copies constituting the first edition (1661–'63) of Eliot's Indian Bible and the 2,000 copies constituting the second edition (1680–'85), perhaps 100 more or less complete copies have survived two centuries. Mr. Pilling, who has pursued these bibles with an ardor only equalled by that of the apostle himself, has succeeded in discovering the location and history of 39 of the first edition and 55 of the second, a total of 94 copies. Of each of these 94 copies minute and detailed description is given, ending with the statement that "Further research will bring to light many more copies of the Indian bible." When we run over the prices paid in recent years for copies of these books, prices varying from $50 to $3,000, we may be pardoned for a little skepticism about the *many* yet to be revealed. Many Indian bibles were lost or destroyed during the Indian war of 1675–'76, and

this destruction became the incentive for a second edition. Eliot's Indian converts, called "praying Indians," like modern Indians, made known their wants, and the old man, full of zeal for the cause to which he had devoted his entire life, set about preparing for a new edition of the whole bible. Whatever may be said of his arguments, his zeal won—a zeal which wholly hid from him the humor of the statement that "thousands of souls, some true believers, some learners, and some still infants, all of them beg, cry, entreat for bibles, having already enjoyed that blessing, but now are in great want." In 1685, when nearly 80 years old, the venerable apostle saw the new edition of 2,000 copies completed.

Use of the Eliot bible ceased about the middle of the last century, and it is said but one man now living *can* and no man *does* read it. Yet it is a very poor specimen of an Eliot bible that will not sell for $250. Thus we see this book utterly neglected for the purposes intended by its author, but eagerly sought for quite other purposes. It is not unique in this respect, and suggests a theme for those who think great libraries should keep useful books only, destroying the worthless trash.

No less than 57 pages of this elaborate bibliography are devoted to Eliot's writings, and so completely and fully is the field worked over and the golden grain extracted that even patient John Chinaman would starve over the tailings.

Of the 1,926 titles of printed articles embraced in this bibliography the compiler has seen and described from personal inspection 1,850, or 96 per cent. Of the remaining 4 per cent. quite a number no longer exist. Similarly Mr. Pilling has described from personal inspection 184 of the 319 manuscripts embraced in the list, or 57 per cent. Dealing with rare, old, choice, and highly prized books, access to which is sedulously guarded, has perhaps led to the printing of a few copies of this book as an edition de luxe on fine paper and with broad margins. It is only in this style of imprint that the beautiful fac-similes can be seen to their full advantage.

The bibliographies which have preceded this relate to the Eskimauan, Siouan, Iroquoian, and Muskhogean stocks, and the next following one relates to the Athapascan languages. Still others are in preparation, and it is earnestly to be hoped that the compiler, who in impaired health has lost neither heart nor interest in this laborious work, may be long spared to continue it and to realize his dream of a "Bibliography of the Indian Languages of North America."

MARCUS BAKER.

Bibliography of the Athapascan Languages. By James Constantine Pilling. Washington: Government Printing Office. 1892.

Of the Tinneh or Athapascan tribes of North America, Hubert Howe Bancroft tells us that they are "A people whose diffusion is only equalled by that of the Aryan or Semitic nations of the old world. The dialects of the Tinneh language are by no means confined within the limits of the Hyperborean division. Stretching from the northern interior of Alaska down into Sonora and Chihuahua, we have here a linguistic line of more than four thousand miles in length, extending diagonally over forty-two degrees of latitude, like a great tree whose trunk is the Rocky Mountain range, whose roots encompass the deserts of Arizona and New Mexico, and whose branches touch the borders of Hudson Bay and of the Arctic and Pacific oceans."[1] They form, too, a people long known to the Europeans. There are few families of American tribes existing to-day who were known to us at an earlier date than the Athapascan family.

Notwithstanding the wide diffusion of this stock, the bibliography of its languages does not seem copious when compared with the bibliographies of the languages of the more narrowly limited Eskimo, Siouan, Iroquoian, Muskhogean, and Algonquian families. The work now under consideration is the sixth, in order of issue, of the valuable bibliographies of American linguistic families which Mr. Pilling has compiled. The bibliographic lists proper of these six volumes contain the following numbers of pages: Eskimo, 109; Siouan, 82; Iroquoian, 180; Muskhogean, 103; Algonquian, 549; Athapascan, 115. The Athapascan is thus represented to a degree comparatively meager, considering its wide diffusion, chiefly for the reason that tribes of this stock dwell in remote parts of our continent, where missionaries and others of scholarly bent have rarely penetrated until within recent years.

This volume is prepared throughout with the same scrupulous and intelligent care which has characterized all the previous efforts of its author and in accordance with the most approved recent models of bibliographic work. In additions to titles and descriptions of books in over forty different languages and dialects, there appear four fac-similes and about forty biographies, nearly half of which

[1] *Native Races of the Pacific States*, vol. iii, p. 583.

are published here for the first time. The work records all the titles that could be found, with most painstaking research, in Anglo-American libraries and collections, public and private, and in the library of the British Museum. It is not improbable that Spanish-American collections might yield something more if examined.

A chronological index occupies the last nine pages of the book. The first entry in the index bears the date of 1744. Four authors are mentioned as having placed on record something of the Athapascan tongues in the 18th century, but all these authors studied the languages of the far north. For two centuries before they wrote the Spaniards and their descendants had been listening to the tongues of the far south. It is generally conceded by students of the Pueblo and Athapascan languages in the Southwest that the name *Tusayan*, which Coronado applied to the Moki country in 1541, is of Navajo origin. It would be strange if in those two hundred years the Spanish missionaries and explorers had made no further record of these tongues.

Mr. Pilling tells us in his preface (p. 6) that "The present volume embraces 544 titular entries, of which 428 relate to printed books and articles and 116 to manuscripts. Of these 517 have been seen and described by the compiler, 422 of the prints and 95 of the manuscripts, leaving 27 as derived from outside sources, 16 of the prints and 21 manuscripts." We quote the above for two reasons: first, to give the reader a better idea than we have heretofore given of the scope of the work, and, second, to point out the only error that we have discovered in the book. $16 + 21 = 37$, not 27; for 16 read 6.

W. MATTHEWS.

Some Strange Corners of Our Country. By Charles F. Lummis. New York: The Century Company. 1892. Pp. xi-270, illustrations. 12°.

The "strange corners" from which Mr. Lummis has brought to light a score of interesting and hitherto almost unknown facts is the great Southwest, a veritable wonderland to the tourist and ethnologist alike. The stories which the author relates were gleaned during several years' residence in Arizona and New Mexico, especially in the Indian pueblo of Isleta on the Rio Grande, where unusual facilities were afforded for studying the less-known customs of the Tiguas.

These strange corners are described in a felicitous vein, and details such as can be given only after careful research are faithfully and accurately, though simply, portrayed in a manner that all may read and learn, and many become dispossessed of the popular fallacies regarding this little-known region. The Moki snake dance is described and a chapter is devoted to the Navajo hunting custom of "begging the bear's pardon." Under the title "The witches' corner" some interesting facts are given concerning the practice of sorcery by the Mexicans as well as by the Pueblos. The Pueblo "magicians" or medicine-men (the *brujos* and *hechiceros* of old Mexican annals), who perform many wonderful feats of legerdemain, and the "self-crucifiers," or so-called Penitent Brothers, who still practice the barbaric custom of crucifixion as a means of penance, are given a place in the book. "Homes that were forts" (referring to the former cliff-houses of the Pueblos), "Montezuma's well," and "Montezuma's castle" are chapters of special interest to the archeologist.

One of the greatest of all the wonders of the Southwest is the "Stone Autograph Album"—*El Morro* of the Spaniards and the Inscription Rock of our times. On the massive face of this great rock "castle" west of Zuñi were carved the autographs of Oñate in 1605, Vargas in 1692, and later of the Hurtados, Nieto, Lujan, and others who pressed forward to Zuñi, bearing both cross and sword. Fac-similes of these inscriptions, with interlinear and free translations, are given.

The recent lava flows of central New Mexico are described under the caption "The rivers of stone," and the description of the process of weaving the famous Navajo blanket is illustrated by a colored plate of the finished fabric. "The blind hunters" are the animal fetiches of the Pueblo and Navajo used in the chase, and "Finishing an Indian boy" is the title of a chapter on the long and arduous life ceremony undergone in making a medicine-man. "The praying smoke" is the sacred Pueblo cigarette, which more than performs the duties of the better-known calumet, and the "Dance of the sacred bark" refers here to the sacred scalp dance of the Village Indians, for the first time described. An account is given of the Pueblo method of "doctoring the year," and space is found for a word on the home life of the Isletaños. In fact, the volume is brimful of interesting things by which all may profit. It is abundantly illustrated. F. W. HODGE.

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NOTES AND NEWS.

Origin of Certain Mound Relics.—The Shawnees have heretofore by common consent been regarded as the wanderers, the nomads, of the Indians east of the Mississippi. Recently there have been suggestions that they were formerly builders of mounds; and now Professor Cyrus Thomas,* adding to the number of his notable contributions to American archeology and ethnology, has essayed to show that the Shawnees were habitual mound-builders until after the arrival of Europeans, and that one of the mounds of the great Etowah group was made by them.

Attention has been drawn by several writers to the fact that the form of sepulture called box-stone graves is found wherever Shawnees dwelled. They are found in central Tennessee, which was for a long time their fixed home; in the Cherokee country, where a band lived for a time; in northern Georgia, where there were some villages of them; in Pennsylvania, where they lived with the Delawares; in Ohio and southern Illinois; and no other Indians have been known to practice this mode of burial, except, to some extent,

*The Shawnees in Pre-Columbian Times. *Am. Anthrop.*, vol. iv, 109, 237.

tribes with whom or near whom the Shawnees lived—the Delawares and some of the Illinois tribes. The box-stone graves must be accepted as an ethnic characteristic of the Shawnees.

In Tennessee, where the nation long had their home, cemeteries of box-stone graves are habitually associated with mounds; such graves are frequently found in mounds, and mounds are sometimes little more than a cover over tiers of graves. In Illinois the same contiguity and intermingling are found. It is certain that the mounds which contained such stone graves were built by the men who made the graves. That being admitted, there is little room left to doubt that the associated mounds and connected works were built by the same people. Hence it follows that the Shawnees, when a sedentary people, habitually made mounds and associated earthworks.

One of the Etowah group, a considerable mound, but dwarfed by the grandeur of the great one of the group, when carefully excavated was found to have been built over a group of stone graves. In some of these graves were found copper plates, incised, or stamped or hammered with outlined figures. These when found baffled conjecture. The care with which the excavation was made by practiced hands left no room for suspicion of fraud. They were, then, placed there by those who made the graves.

At first sight the figures stamped upon the copper plates seemed Mexican or Central American; but closer examination showed that while the figures in general were of the Mexican type, there were some differences. Some of the figures are winged; the wings are represented as part of an entire bird skin enveloping the figure as in the Indian designs, but are made to spring from the body behind and between the shoulders, which is a European conception. The drawing of the limbs is European, not Indian. On one plate are distinct marks of a sharp metallic tool. Another is made of pieces welded together. Several are fastened by small rivets, neatly wrought. The workmanship was European; the plates were made by Europeans to represent Indian designs. The question remained, How did they get to the northern part of Georgia when none are found south of that point?

In the seventeenth century Spaniards had settlements and worked gold mines in northern Georgia and contiguous territory. Portions of their work remain and contemporary records exist. Father Lalemont, in the Jesuit Relation for 1662, giving an account of the

Outoagaunha or Shawnees, brought by the Iroquois from an incursion into their country, says: "Their villages lie along a fine river that empties into a great lake, as they call the sea, where they have commerce with Europeans who worship God as we do, use rosaries, and have bells to summon to prayers. From their account we suppose these Europeans are Spaniards." According to De la Potherie, a Shawnee prisoner taken in 1665 gave a somewhat similar account.

The Shawnee builders of these graves might have got these plates from their Spanish neighbors. There are other circumstances which corroborate this view.

M. F. FORCE.

THE WHISTLE LANGUAGE OF THE CANARY ISLANDERS.—M. Joseph Lajard has printed in the Bulletins of the Society of Anthropology of Paris (Tome Deuxiéme, IVe Série, 3e et 4e Fascicules, 1891) two very interesting accounts of the whistle language of the Canary islands and of the use of whistling as a means of communication elsewhere. The knowledge of scholars regarding this means of converse was hitherto meager. The whistle language of the Canaries appeared to constitute a special phonetic system without any analogy with forms now known; but a sojourn of M. Lajard in the Canarian archipelago gave him the opportunity to determine the nature of this language. Its use is confined to the poorer classes and to shepherds, for even many of the islanders are ignorant of its existence. The methods of producing the whistled sounds are divided into three classes, according to the organs employed in their production, namely: *a*, by means of certain fingers of one hand applied to the mouth in one of five different attitudes; *b*, by means of certain fingers of both hands applied to the mouth in one of two different attitudes; *c*, by the means of the lips and tongue only.

The first thing decided was whether there was a musical basis for this system; but it was found that the same word is produced by notes executed differently according to the whim of the whistler. Some began with a grave or deep sound, ascending and afterward descending; others would choose a point of departure much higher and then descending back to the starting point. Every one uses a different register; there is analogy, but not identity. This observation clearly excludes the musical hypothesis. The whistled

sounds correspond exactly to the syllables of the spoken word; but there is one more whistle syllable in names than there are in the spoken name; it is an exclamatory hailing syllable; hence, the pretended whistle language is of the Canaries nothing more or less than whistled Spanish, constituting no distinct system of speech.

The use of whistling is adapted to mountainous surroundings and not to level tracts.

It being possible to whistle other languages, it would be astonishing should it be found that they are not; but a small number of observations shows that they are, but only in a very rudimentary manner. A sojourn in Corsica was the means of enabling M. Lajard to show that the shepherds there whistle with great ability, there being an analogy between their whistling and that of the Canary islands. It is very singular, he adds, to find it in cultured communities, even in Paris itself.

Workers at the same trade or occupation have this means of intercourse. Carpenters and stone-masons respectively have their language of whistled sounds. Beside that of the honorable professions, there is another, endowed with a rich vocabulary, found among thieves. Whistle language is highly appreciated among the poaching, marauding, and ex-convict gentry.

Evil-doers have borrowed names, and these are the ones whistled. This kind of sobriquets composes the bulk of the whistle language in Paris, which is very different from what is true in the Canary islands, where the entire language may be whistled. In cultured communities conventional signs compose the bulk of the whistle language.

"It appears," says M. Lajard, in closing, "from the sum of the facts that whistle language has a very wide distribution; it will without doubt be found in many different places. At the present time, it is enough that we have discovered certain rudiments of it at Paris and elsewhere. Despite the enormous distance which separates the complete system of the Canaries from the simple traces of it seen in our streets, it appears to me useful to notice the features by which one may compare them, even should the comparison result only in the complete eradication of the ancient errors regarding that of the Canary islands. The special medium where it may flourish has been noticed, as well as certain analogies relative to those who employ it, in the condition and needs of their lives."

J. N. B. HEWITT.